
MEDICAL REPOSITORY.

VOL. V.—No. III.

ARTICLE I.

A CASE of HYDROPHOBIA: Communicated by JOHN REDMAN COXE, M. D. to Dr. MILLER.

SIR,

Philadelphia, Sept. 19, 1801.

The following case of hydrophobia, which came under my notice during my residence in London, is much at your service, should you think it worthy of insertion in the Medical Repository.

I am, with great respect,

Your very obedient servant,

JOHN REDMAN COXE.

London Hospital, Tuesday, Dec. 1st, 1795.

A BOY, aged about eleven years, was admitted at 4 P. M. labouring under an attack of hydrophobia. The account given of him was, that, about twenty months ago, he was bitten by a mad dog on the — carpus; for which he was bathed in the salt water at Gravesend. He received a second bite, about a year ago, on the fingers of the same hand, and again was bathed at Gravesend. From that time, till Sunday last, he continued perfectly well; but, in the evening of that day, he complained of a pain in his stomach, and of being “sick all over.” He dined and supped, on that day, very well, and passed a good night; but, on Monday, he suddenly escaped from his mother’s arms, and ran into the street. Since which time he has taken nothing liquid, and scarcely any thing solid; but convulsions have been more or less frequent, together with a violent repugnance to all kinds of fluid.

His present symptoms are, constant convulsive motions, irregular as to strength; low and quick pulse, the heart, at the

same time, beating with considerable violence;* dilated pupils; pain of stomach, which he principally complains of, and which he ascribes to a quantity of wind rising like a ball in his throat and nearly suffocating him; uniform aversion to fluids; convulsions being induced by the mere sight of a cup brought to him to drink from; and a similar effect is even not unfrequent from the discharge of his saliva; no passage from the bowels since Sunday. He is perfectly sensible; but answers with difficulty to the questions proposed to him.

Mr. Blizard, one of the surgeons of the hospital, was fortunately in the house at the time the boy was admitted. He ordered a common laxative glyster, to obviate costiveness; and, at my request, politely agreed to try the effect of cold water, thrown suddenly over the patient, according to the plan proposed by Dr. Rush, in tetanus. The boy was immediately placed in a large tub, and one or two buckets full of cold water thrown suddenly over him from behind. Our anxiety was relieved by finding how well he bore it, without any convulsions, of which we were fearful. In about half an hour it was repeated, with apparent advantage. As a diminution of those constant convulsive motions I before noticed, appeared to take place, the pulse, at the same time, becoming more full, Mr. Blizard ordered it to be repeated every hour, and to administer a second injection, in a short time, with the addition of forty drops of laudanum.

At half past eight in the evening I saw him again; since when the bath has been repeated *three* times, or *five* times in all. His pulse, though considerably quicker (upwards of 140), seems not much altered in strength. The convulsions are less frequent and violent; and he *now drinks* without any very great degree of violence to himself; for although when a fluid was brought in a glass he appeared desirous to avoid drinking, yet, on being urged, he at length seized and drank several mouthfulls. His attendants say, he has both eaten and drank several times since we were last here. He is quite sensible, and though he prefers silence, yet he answers all questions with less aversion. His countenance has a wild and very peculiar expression; tongue whitish; he passes his urine with perfect ease, and without regarding the sound; though the sound of

* By applying the hand to the breast, in respiration, a sensation was communicated as if the bronchiæ were loaded with a fluid. In two cases, which I understood had terminated fatally in the hospital, dissection evinced an unusual quantity of fluid in the bronchiæ. In one of these, bleeding to a large amount, I was informed, had been used.

water pouring in the tub, in which he was placed, appeared, at first, to cause great agitation. The convulsions now appear almost entirely under the form of a constant hiccup, accompanied with a more violent retraction than usual of the head and neck.

He seems much distressed by something in his mouth, which he imagines is the hair of the rug and blanket of his bed, and endeavours continually to remove it, by passing his hand quickly and frequently over his mouth; as no hair could, however, be discovered on inspection, it most probably arose from the viscosity of the saliva, which adhered considerably to the fauces.—He notices no one but his mother, and her only when spoken to.

This being a *medical* case, the physicians of the hospital met about this time in consultation; and concluded to suspend the use of the cold water, and endeavour to excite a speedy salivation, by means of mercurial frictions; for which purpose, two persons were ordered to relieve each other, during the night, in rubbing in the ointment on various parts of the body; but before this could be effected, death released the unfortunate sufferer, about two in the morning. He died with ease; and his body was immediately removed by his friends, so that no information was afforded by dissection.

In the above case we may notice several circumstances.—1st. The time between the bite and the actual disease. Whether the *first* bite had any influence in the production of the disease is, perhaps, impossible to ascertain. At any rate, the *second* bite, at the distance of twelve months, is another mournful proof of the great length of time during which this very extraordinary virus is capable of remaining in the system, unaltered, and unassimilated to the general healthy state of the fluids. We have two authentic instances of a lapse of eighteen and nineteen months between the bite and the consequent disease.* As for the cases on record of twenty and even forty years interval, I must either dispute their credit, or consider them as accidental concomitants of some other disease, as hysteria, &c. which I shall speak of presently. It would, doubtless, be very desirable to ascertain, with precision, the utmost limits between the bite and the disease; as this knowledge would tend to allay, after the expiration of that time, the dreadful apprehensions of those who, at any preceding period, have unfortunately been bitten. Dr. Babington considers from four to twelve weeks

as the interval in most cases which have occurred.* What becomes of the poison during this interval? Are we to suppose it remains in the part bitten till near the time of the disease taking place? If so, we must also suppose, that excision of the part, at any period prior to the commencement of the attack, would prove a certain preventative. How far this is actually the case I know not; but it certainly deserves more accurate investigation than has, I believe, been afforded it. At all events, it appears to me, that a removal of the part, *at any time*, is to be recommended, even though weeks or months have intervened.

2dly. Some of the symptoms occurring during its continuance deserve notice. As to the *dread of fluids* existing in this disease, we find a remarkable relief from the difficulty of swallowing was experienced towards its close. The same was observed in Dr. Ferriar's case,† and he refers to Mead, Lieutaud, &c. to shew, that "the disease has even been said to exist without any horror of water or difficulty of receiving it into the stomach." It is well known that this symptom has occurred, not only in hysteria and tetanus, but also in the yellow fever, in typhus, dysentery, and in hydrocephalus.‡ Dr. Rush has also enumerated a variety of other causes of this extraordinary symptom;§ and Dr. Cullen says, "We have known an instance of hydrophobia, in consequence of an inflammation of the stomach, independent of any bite of a mad dog.|| The greater contraction of the muscles, of the glottis, in swallowing fluids, than is necessary in swallowing solids, by which, in their highly irritable state, such a spasmodic constriction takes place as to endanger, and eventually to occasion, suffocation, is sufficient to account for the difference of pain in these two actions. But, I apprehend, the association of ideas of pain, with the attempt to

* Medical Records and Researches, p. 130.

† Medical Facts and Observations, vol. i. p. 6.

‡ This was remarkably the case in a young boy, of about 10 years of age, in whom the usual symptoms of hydrocephalus supervened an attack of common inflammatory fever in March, 1792. He was vomited, bled, purged and blistered. About the 9th or 10th day from the first attack, he began to find *great difficulty in swallowing*, which continued to increase to such a degree, "that, whenever the smallest quantity of any fluid touched the muscles of deglutition, he was *thrown into convulsions*, and finally died of a fit which lasted about three hours, and was induced by attempting to swallow a small quantity of cold water." The viscera of the thorax and abdomen were healthy; but water was found in the pericardium and ventricles of the brain. MM. S. Cases.

§ Observations on Hydrophobia, p. 213.

|| Clinical Lectures, p. 173.

swallow, is scarcely to be considered as adequate to the explanation of this symptom. That imagination has something to do with it, is evident from this, that even a looking-glass presented to the patient, will sometimes produce the same effect. In some cases, also, of angina, the pain of swallowing is excessive; yet I do not recollect, that the dread of fluids or solids ever amounted to an actual state of hydrophobia, although the recollection of past pain in swallowing must have been pretty considerable.

Whether the cold bath, employed in this case, had any effect in relieving this symptom, is, perhaps, difficult to ascertain. I have always considered it dependent on this cause, as it took place so soon after its use, and as its powerful effect in resolving spasm is well known. Its employment at so late a period of the disease, perhaps precluded the possibility of perfecting a cure; yet I consider the suspension of its application as a cause of regret. In Southwell's *Med. Essays** it is noticed, that the horror of water was overcome by pouring water on the patients till they were almost suffocated; "thus, among others, a man was tied to a tree, and had 200 buckets of water thrown on him: he recovered without any other assistance."

The *dilated* pupil, in our case, would seem to indicate an affection of the brain; yet no pain of that organ was complained of. A similar dilatation, though in a much greater degree, is mentioned by Dr. Bensell, in the case related in the *Medical Transactions* of the College of Physicians of Philadelphia, in which no pain of the head existed. Again; dissection, in several instances, has shewn *much distension* of the vessels of the brain, in which, however, no mention is made of this symptom. Perhaps, in those cases in which it occurs, it may be merely a sympathetic affection of the brain, arising from the irritation of the parts more immediately concerned in the disease.

With respect to the remedies which, at different periods, have been proposed for the cure of this formidable disease, *repeated instances* have shewn their *inutility* and *inefficacy*; the further trial of these I must, therefore, be allowed to consider as absolutely *trifling* with the *life* of the unfortunate sufferer. Of this description are mercury and opium, at least if employed alone; for, possibly, combined with other means, they may prove useful; though, after reading Dr. Babington's case,† in which 180 grains of opium were given in less than 11

* Vol. iii. p. 93, 94, abridged from the *Memoirs* of the Royal Academy, Paris.

† *Medical Records and Researches*.

hours, without the least mitigation of the disease, or even producing a disposition to sleep, or Dr. Wavell's case, in which he administered, ineffectually, in about 24 hours, 54 grains by the mouth, and 10 in an enema; I think we might safely discard its use altogether in this disease.

As to the various cases which are reputed to have yielded to blood-letting, I must confess that I coincide in opinion with Dr. Mease, who has taken much pains to shew that the hydrophobia, in these instances, was derived from other causes than the canine virus. This being my opinion, it is clear that I cannot yet give my assent to the ingenious doctrine of the kindred nature of this disease with malignant fever. The limits of a letter do not admit my saying more on this part of the subject, further than that I wish much to see this opinion substantiated or refuted, by actual proof of the utility of blood-letting, carried to its utmost limits; and even to try the effect of transfusing the blood from an healthy animal, whilst the whole mass of diseased blood (supposing this the case) is suffered to escape.

I must here be allowed a few words on the subject of inflammation of the stomach, &c. which has been advanced as a proof of the connection of the two diseases. Were this the case, I should imagine that this symptom would have occurred much more frequently than we find it recorded. It is not perhaps one case of an hundred of yellow fever, terminating fatally, in which inflammation of the stomach and intestines is not detected; but, on the contrary, in hydrophobia, not more than one of an hundred will probably exhibit this symptom on dissection, and even then in so light a degree as to render it highly probable that it arises from the long continued action of the *undiluted* gastric juice, or from the remedies employed. Where this symptom takes place in a more considerable degree, it appears to me entirely dependent on the remedies made use of. Thus in the case related by Dr. Borrowe, in your last number,* the quantity of cantharides employed in one day, must, in so young a subject, have been fully equal to the production of gastritis; and this is rendered more probable from this symptom commencing during the night, subsequent to the administration of the tincture. That the black vomit in this instance depended upon the accidental inflammation of the stomach, unconnected with the other disease, I have no doubt; though Dr. Babington† relates that

* See Med. Rep. vol. v. p. 73.

† Medical Records and Researches, p. 123, 124.

his patient, a few hours preceding death, "began to bring up from his stomach large quantities of a thin *chocolate coloured* liquor," whose stomach on dissection shewed no symptoms of inflammation. Had this disease been of the highly inflammatory nature to require copious bleeding, we might reasonably have anticipated the most violent inflammation of the stomach and bowels, &c. in consequence of the enormous quantity of opium taken. Although the tincture of cantharides failed in the instance related by Dr. Borrowe, might this not have been entirely owing to the late period of its being employed? It certainly deserves a faithful trial from the earliest attack of the complaint; and I must consider physicians as under great obligations to Dr. B. and the other medical gentlemen, for the information to be derived from that unsuccessful case.

In addition to cantharides, both externally and internally, for the purpose of exciting a disease elsewhere, considering the hydrophobia in the light of a spasmodic affection, especially of the muscles of the glottis, I should certainly wish a fair and *copious* trial of the affusions of the coldest water, even as far as from two to six buckets full every quarter or half hour. If we can persuade the patient to swallow, I would employ large doses of the most highly diffusible stimuli, such as the oil of amber, alkohol, and æther, as more likely to prove useful than others not so quick in their operation on the system.

As this disease is so very rapid in its progress, every measure must be pushed to the utmost without delay. As soon, therefore, as the above plan was found likely to fail, I should assuredly think it right to try the operation of tracheotomy as proposed by Dr. Physick. If the disease is solely confined to the muscles of the glottis, the chief danger of the disease, viz. that of suffocation, will be obviated, and we may hope for a favourable termination to the spasmodic irritation in due time. Should the pain of swallowing, however, continue so excessive, owing to the diseased state of the muscles, although no danger of suffocation exists, might we not safely diminish the sufferings of the patient, by introducing both medicines and food *through a flexible tube passed into the stomach* either by the nose or mouth, and suffered to remain there till the disease had abated? By seldom removing it the muscles would seldom be excited to action, and, consequently, would sooner regain their healthy state. It is by no means improbable that a tube thus passed, might even preclude the

necessity of tracheotomy, as the spasmodic stricture is chiefly induced by the action of swallowing, which would by this measure be prevented; and that it is capable of being carried into execution I believe is beyond a doubt, from the same plan having been pursued, where violent injuries to the face, mouth, &c. have produced a total inability to take in nourishment. I cannot now recollect where to refer for this case, but I think it is in Dessault's Chirurgical Journal, which I have not at hand. As so many remedies have been employed in this hitherto hopeless disease, I think it worthy of a trial, considering, with Celsus, that "*Satius est enim anceps auxilium experiri, quam nullum.*"

I have now only to ask, as I do not recollect, whether in any of the dissections which have been made of persons falling victims to this disease, any notice has been taken of the actual state of the *salivary glands*? If so, I would enquire what it is, and whether the pancreas, which is considered in the same light, is similarly affected? As the virus is contained in the saliva, we must suppose it is produced by an altered secretion of the glands; and yet were that the case, how can we account for man not being able to propagate the disease to the inferior classes of animals? At least experiments,* at present few in number, give us some reason to think this is the case.

ARTICLE II.

MISCELLANEOUS OBSERVATIONS *relating to the DOCTRINE of Air: In a Communication from JOSEPH PRIESTLEY, LL. D. &c. to Dr. MITCHILL, dated Northumberland, July 30, 1801.*

DEAR SIR,

FLATTERING myself that it will be agreeable to you to be informed concerning some of my late experiments, I shall mention the results of them, without troubling you with a detail of all the particulars.

1. I have long observed, as you see in some of my earliest publications, that making fixed air ever so pure, there is a part of it, generally the 30th, which will not be absorbed by water, but is permanent air; and even if that which has been absorbed by water be expelled from it by heat, the whole of

* Med. Records and Researches, p. 135, 136, &c.

it will not be absorbed again, but that the same proportion of it will become permanent air; so that, to appearance, the whole of it might, by repeating the process, be converted into permanent air. This is probably the case with every other kind of air that is readily imbibed by water. And I have found that this part of all those kinds of air is considerably increased by the application of heat; at least it is so when I heat in any of them a bit of crucible, which, having been frequently exposed to very great heats, cannot give out any air by any more exposure to heat. In order to be more sure of my conclusion, I always used the same bit of crucible, and I observed that there was no sensible increase of the bulk of the air in consequence of any of the processes.

Heating the bit of crucible, by means of a burning lens, several hours, in a quantity of fixed air, I found that, whereas of the original quantity only a forty-second part remained unabsorbed by water, the residuum was now a fifteenth part. I had a similar result in many other experiments with this kind of air, and the standard of the residuum was always lower than that of common air, generally 1.5; which is the same with the residuum of the air not treated in this manner.

Instead of the bit of crucible, I heated *finery cinder* in this kind of air, and had the same result, except that the standard of the residuum was lower, viz. 1.8 or 1.9; so that it must have been almost wholly phlogisticated or inflammable.

The increased residuum of *hepatic air*, treated in this manner, was slightly inflammable air.

I had a similar result in my experiments with *marine acid air*, and *vitriolic acid air*, though the residuums, as may be supposed, were very small. But though that of the marine air had been 0.05, that of the residuum, after this process, was 0.2. It was also completely phlogisticated; whereas the standard of that of the original quantity was 1.5. After the process, the bit of crucible, exposed to a red heat, burned a long time with a green flame.

Of the *vitriolic acid air*, the increase of the residuum was in the proportion of not less than 10 to 1. After the process, the bit of crucible, exposed to heat, exhibited no particular appearance.

That the element of heat, if there be any such substance, enters into the constitution of all æriform substances, cannot be doubted. It is taken up by the vapour of water, and that of other fluids, which resume their fluid form when the external heat is withdrawn. What circumstance it is that makes

this principle of heat attach itself to any aëriform substance; so as to remain combined with it, and not to be separated from it in the common temperature of the atmosphere, or in any degree of cold that we can apply to it (in other words, what it is that constitutes any permanent air), is one of the greatest *desiderata* in the doctrine of air. That water, or rather vapour, is the basis of all the different kinds of air, or that which constitutes at least the greatest part, if not the whole, of their *weight*, I see every reason to believe; but in what manner any other principles so attach themselves to this vapour as to make them become the various kinds of permanent air, is the great question. Indeed, a knowledge of the *elements* which enter into the composition of natural substances, is but a small part of what it is desirable to investigate with respect to them, the principle, and the mode of their *combination*: as how it is that they become hard or soft, elastic or non-elastic, solid or fluid, &c. &c. &c. is quite another subject, of which we have, as yet, very little knowledge, or rather none at all.

2. I see, by various publications which I have lately received from Europe, that the constitution of *phlogisticated air*, called in the new theory *azote*, is the subject of much discussion. Many of my experiments, I think, clearly prove; that, like fixed air, it consists of dephlogisticated and inflammable air, as containing the principle of phlogiston; though I have observed that, in some cases, it seemed to be produced from inflammable air only, without any mixture of dephlogisticated air. I have lately made another observation, from which it seems to be probable that dephlogisticated air enters into its constitution. I therefore conclude that it must do so universally; and that in those cases in which I did not purposely introduce any dephlogisticated air, or any substance into which it enters, it came from the atmosphere through the water in which the process was made.

Having kept a large quantity of inflammable air several months confined by water, I found that it was by no means so pure, and proper for my experiments, as that which was recently made; and it appeared to contain a proportion of phlogisticated air. Some dephlogisticated air had probably got through the water, and had united itself to the inflammable air in the jar, so as to give it the mixture of phlogisticated air. I shall observe whether, in a course of time, the whole of the inflammable air will not, by this means, be converted into phlogisticated air.

-In your Repository, vol. ii. p. 171, first edit. I mentioned an experiment which I made on the dispersion of a *diamond* by the heat of a burning lens in atmospherical air, from which I inferred that, in its constitution, it resembled *charcoal of copper*. Having been favoured with several larger diamonds by Mr. Jefferies, an eminent jeweller in London, I have lately made several other experiments which confirm that supposition. The most satisfactory of them is the following:

In $4\frac{1}{2}$ ounce measures of dephlogisticated air, of the standard of 0.6, with two equal quantities of nitrous air, I heated a diamond, which weighed one-seventh of a grain, till it entirely vanished; after which the air was reduced, by means of lime-water, to $1\frac{1}{2}$ ounce measures, of the standard of 1.92.

The weight of the fixed air produced in this process greatly exceeding that of the diamond, it is evident that the substance of it must have united with the dephlogisticated air, to form the fixed air. As the weight of this air was nearly three grains, and that of the diamond about a fourth part of it, the proportion of dephlogisticated air in fixed air must be the same that I found it to be in my former experiments.

According to this experiment, the diamond and charcoal of copper, though so different in appearance (the one solid and beautifully transparent, and the other a black and friable substance), are, as nearly as possible, pure phlogiston. For though something, no doubt, remains after their dispersion, it is too small to be discovered.

Submitting these experiments and observations to your better judgment, and that of the readers of your valuable Repository, I am, with great esteem, dear Sir, yours sincerely,

J. PRIESTLEY.

ARTICLE III.

An Account of BILIOUS COLICS, as they appeared in several Towns in the County of Cumberland, District of Maine, in the Months of May, June and July, 1801; and of the surprizing Relief obtained therein by Alkaline Remedies.
By Dr. JEREMIAH BARKER, of Portland.

DURING the months of January and February the weather was very cold, and the snow of considerable depth. General health prevailed, excepting that the chicken-pox appeared in several towns.

The months of March and April were unusually warm and rainy. Catarrhal affections were prevalent among adults, and several cases of croup occurred among young children.

In the months of May, June and July, which were also rainy and very warm, the bilious colic, as it is termed by systematic writers, was prevalent, and, in some instances, highly malignant.

The disease was ushered in with pain in the bowels, nausea and vomiting. The matters discharged from the stomach were green, and said to be attended with a burning heat. As the disease advanced the patient became feverish and thirsty, and the abdomen swelled. The matters then ejected were of a dark green hue, and emitted a very rancid smell. The bowels were generally constipated from the commencement of the disease.

The subjects of this disease were those whose digestive powers had become weakened, and who, in most cases, indulged freely in fresh meat and fresh fish with salads.

A suitable emetic, combined with alkalis, and worked off with an aqueous solution of sal absynth. soda or lime, or with the cretaceous julep, frequently eradicated the disease, even when it was so far advanced that the abdomen had become tense; and this was generally effected without any cathartic operation being produced. When the stomach was not greatly loaded with noxious matters, a liberal use of alkaline salts or earths would sometimes remove the complaints. Oils likewise, in such cases, often afforded relief, without effecting any sensible operation upon the intestines. But cathartics, independently of these remedies, seldom mitigated the complaints, although they operated freely. This I had several opportunities of seeing verified; for attempts were made, by some, to cure themselves in this way, imagining that the disease proceeded from the intestines being overcharged with bile; so that discharging this supposed offending fluid by cathartics, particularly by *bilious pills*, was considered, by them, as being the most eligible mode of procedure. Unhappy consequences, however, were experienced, in several instances, by their attempting to displace a fluid by no means accessary to the mischief; while some things were left undone which it had been better to have done.—A few cases will serve to exemplify the practice.

In May a middle-aged man, in a neighbouring town, was attacked, in the morning, with the usual symptoms of this disease. I was called the second day, and arrived at 12 o'clock.

As I entered his room he was vomiting matter of a dark colour and foetid smell. His pulse intermitted, and he was in a cold sweat. He died within an hour. He had taken bilious pills, which operated through his bowels, yet no relief was procured. He also drank some cyder, because he was told that acids were recommended by Dr. Buchan in bilious colic.

An aged man, in a distant town, complained of a slight pain in his bowels, thirst and fever. He took a dose of bilious pills, which afforded some relief. After this an officious neighbour directed twenty drops of elixir of vitriol in a cup of water every hour. The pain then increased, with a sense of heat and oppression of the præcordia, nausea and retching. I was called the third day, in the forenoon, when his abdomen was tense, and very sore to the touch. His throat and mouth were considerably inflamed, and his pulse was very quick and weak. He died in the afternoon.

In June a young man, remotely situated, was attacked, in the morning, with pain in his bowels and vomiting. The matters ejected were green. Spirits and opium were taken, but no relief was procured. At 12 o'clock he was bled, and castor oil was liberally given. In the afternoon he became very thirsty, and his abdomen swelled. The matters then ejected had acquired a bottle-green colour, and a very rancid smell. The next morning his limbs became spasmodically affected, and he died at 8 o'clock. Immediately after death his body acquired a purple colour. This man had indulged freely in fresh fish, with salads, the preceding day.—I rode several miles to obtain an accurate account of this case.

About the same time a middle-aged woman was seized, in the morning, in a similar manner, having undergone considerable fatigue the day before, and supped upon fresh fish. She took severally two doses of bilious pills, which were readily ejected by vomit, affording some relief. The pain in her bowels, however, returned in the afternoon, notwithstanding half an ounce of paregoric elixir was taken soon after the ejection of the second cathartic. A dose of castor oil was then given, and although it operated several times cathartically, her complaints were not mitigated. At two o'clock the next morning, when I was called, she complained of great pain in the bowels, which were tense, and sore to the touch. She ejected whatever was taken into the stomach, and was very thirsty. The matters ejected were of a dark green colour, and of a rancid smell. I gave two grains of tartar-emetic, with

twenty of sal absynth. which operated six times freely; each ejection being followed with half a pint of warm water, impregnated with a like quantity of the alkaline salt. The vomiting and thirst then ceased, and the pain as well as tension were almost wholly removed, although the emetic did not operate cathartically. As she was somewhat faint and fatigued, a little essence of peppermint was given in cool water. This revived her stomach, and she soon took some boiled rice. The next day she was able to walk the room, and very soon recovered her strength. This patient observed, that when she threw up the first dose of pills, the matter tasted like *sour runnet*.

On the same day of her attack, a servant maid in the house was seized with pain in the bowels and retching. She also took a bilious cathartic. The next morning, however, she complained of increased pain in the bowels, and of having passed several bloody stools. She was thirsty and feverish, and ejected her drinks. I gave her thirty grains of ipecacuanha, with twenty of sal absynth. working it off with the alkaline solution. She vomited five times, and found relief. A table-spoonful of castor oil was then given, with twenty-five drops of laudanum. She had a comfortable night, and next day was free from complaints.

A few days after, a child in the family, five years old, was seized with excruciating pain in the bowels, and vomiting. I was called in two hours, and gave one grain of tartar-emetic, with ten of sal absynth. which operated four times, following each ejection with the chalk julep. In less than two hours the child returned to its play. No cathartic operation was produced.

A child, in another family, aged seven months, was attacked with pain in the bowels, vomiting and looseness. The stools were bloody and slimy. I was called in twelve hours. On account of the weakness and frequent vomitings, an emetic was objected to by its nurse. Castor oil, however, as well as magnesia and rhubarb, enemas and opiates, were duly employed, yet no permanent relief was obtained. The third day the abdomen swelled, although the intestinal discharges were frequent. On the fifth day it was seized with convulsions, and died on the seventh.

Soon after, a child, six months old, was seized with pain, nausea and diarrhoea. I was called in three hours, when the pulse could scarcely be felt, and the eyes were motionless. I proposed an emetic, which was objected to. In positive terms

I insisted upon its being given. An emetic of ipecacuanha was then given, with the chalk julap. In fifteen minutes it ejected green matter, revived with flowing pulse, and smiled upon its faithless mother. It was no further molested with disease.

A labouring man was attacked with pain in his bowels, oppression of the præcordia, and retching. He took a dose of bilious pills, which operated cathartically. His pain then increased, and he voided blood. I was called the next morning, when he was feverish and thirsty. His bowels were tense, and tortured with a burning pain. I gave thirty grains of ipecacuanha, with fifteen of sal absynth. which operated six times, ejecting dark green matter. Fifteen grains of sal absynth. were given, in half a pint of water, after each ejection. He was then greatly relieved. After this an ounce of castor oil was given. No more blood was voided, and the next day he was free from complaints, excepting debility.

I was called to a butcher, severely harassed with colic pains, who, in an attempt to describe his disease, exclaimed that he had a "*sour maw*." His complaints were removed by three grains of tartar-emetic, with twenty of sal absynth. following each of the vomitings with copious draughts of lime-water. The next day he had a natural stool.

A young man, in a neighbouring town, was attacked with a burning pain in his bowels, and vomiting. The matter ejected was, as he says, "as black as ink, and set his teeth on edge." He took two grains of tartar-emetic, which ejected a large quantity of this black matter. He then found relief, and soon recovered.

Some of this matter fell upon a white cotton garment, which received a deep black dye. Some days after it was washed with water, but the colour remained unaltered. It was then washed with soap-suds: this changed it to a permanent olive green.

This man's diet, for several days previously to his attack, had consisted chiefly of fresh meat and fresh fish; the latter rather damaged, by being conveyed a considerable distance into the country. Two days before his attack he complained of heart-burn, oppression at the stomach, flatulency, and eructations.—I took half a day's journey in order to obtain an accurate statement of these facts.

On the 20th of June a woman was put to bed in her ninth month, who, during her two last months of gestation, was afflicted with a burning heat in the bowels, thirst for water, and pains about the umbilical region, for which she took no

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medicine. After parturition, which was favourable, the pain and thirst increased, and she was attacked with fever, nausea and vomiting. The matters ejected were of a dark green colour, and very rancid. The stomach was cleansed with ipecacuanha and sal absynth. and the intestines with castor oil. Alkaline salts and earths were then liberally given, and satiation with cool water was allowed. Her complaints were removed in six days. She was placed in a large airy room, debarred from a feather bed, and even from a shred of a curtain. The infant, when born, was found to be remarkably hot and feverish. The mouth and throat were lined with dark coloured *apthæ*. There were vomiting and looseness. The stools were of a dark green colour, and very foetid. The penis turned black, emitted a very putrid smell, and separated, about half an inch from the belly, in twelve hours! Some hæmorrhage ensued, but it was stopped by another ligature, though with difficulty, as the remaining part was putrid. The sixth day the child was seized with convulsions, and died the seventh.

Did not this woman's complaints, in pregnancy, indicate the use of alkalines? and was not a poisonous acid conveyed from the primæ viæ to the blood, and from thence to the *fœtus in utero*?

In July a young woman of a delicate habit was invaded with pain in the bowels, and vomited profusely. She took mint tea and elixir paregoric, but to no advantage. I was called twelve hours from the attack, when her strength was greatly exhausted. She had vomited, as she said, more than a dozen times; still she felt a burning pain in the bowels, and very thirsty. Two drachms of prepared chalk were then given in a cup of cool water, which was readily ejected. The dose was repeated, and retained half an hour, affording some relief. She then threw up a little water. A third dose was given, and her complaints were removed.

An aged man was attacked with a burning pain in his bowels, and vomited several times, which afforded some ease. He then took a dose of bilious pills, which operated cathartically; but, to his astonishment, the pain increased with his looseness. The next day, when I was called, he was feverish and thirsty, and complained of a violent *tenesmus*. I directed cretæ 3 i. sal absynth. ℞i. every hour in cool water; also enemas of soap-suds as often. His pain gradually abated, and in six hours he was free from complaints.—His food was buttered gruel.

SINGULAR CURES.

A sailor, as he says, was attacked with the *rebellious colic*;^{*} and, having no physician on board, drank a pint of strong soot tea, which readily effected the cure.

A man, engaged in making pot-ash, was seized with colic, and, as no physician could be procured, took some *ley*. This afforded speedy relief.

A youth, affected with this disease, was relieved by taking an ounce of rattle-snake's oil; and a hunter, molested with colic, cured himself by drinking half a pint of bear's grease. Were it necessary I could particularize many other cures wrought upon adults, as also upon young children, in this disease, by alkalines and oils, without any cathartical operation being produced, or the employers having a distant idea of the principle upon which the means effected the cure.

By taking into consideration the predisposing causes of this disease, together with the beneficial effects of emetics, alkalines and oils, as also the inefficacy of cathartics, I am induced to believe that the *STOMACH*, and not the intestines, is the seat and throne of what is called bilious colic; and as bilious colic, according to the learned Dr. Rush, is "*only a modification of one original genus of bilious fever*,"† I think we may rationally conclude that the exciting cause is the same; and this cause appears evidently to be a poisonous acid.

What grateful acknowledgments, then, are due to the benevolent Author of our existence, for the admirable constitution of our bodies, by which that important viscus, the liver, is furnished with a natural alkaline antidote, capable, in ordinary circumstances, of counteracting the destructive tendency of this noxious acid!

Wonderful indeed is it, that when this septic poison is formed, and commences its ravages in the stomach, the bilious fluid should quit its accustomed intestinal route, and repair to the invaded organ, in order to exert its alkaline power in quelling and neutralizing the noxious poison, lest it should disorganize the stomach, or proceed into the intestines to their annoyance, and from thence penetrate into the circulating mass, so as to poison the whole body.

To co-operate, therefore, with this health-restoring bile, in extraordinary circumstances, and to reinforce its alkaline power, is, in my view, our indispensable duty.

^{*} A more appropriate term, I think, than bilious colic.

† Account of Yellow Fever, p. 150.

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In the course of my practice, in former years, I have dissected several persons who died of what is called bilious colic; but no accumulation of bile, nor any extraordinary appearance, was discovered in the intestines, excepting an excoriation of the rectum in some cases where tenesmus had been a troublesome symptom. Dark green bile, however, was found in the stomach, which was often injured; in consequence, I presume, of the virulent acid not being subdued by the bile; and no auxiliary, in those cases, had been afforded. On the contrary, exertions were always made by cathartic agents, sometimes by quicksilver, to repulse that neutralizing fluid and effect its expulsion.

I have been much perplexed, in years past, in attempting to account for tenesmus taking place soon after the operation of cathartics, even mild ones, in colics, in bilious and puerperal fevers, and in other gastric diseases, where emetics or alkalines had not preceded their use. Of late, however, I have been induced to believe that a poisonous acid being conducted from the stomach to the rectum, gave rise to the irritation and excoriation of that portion of the intestines.

In a fatal case of puerperal fever, sixteen years since, in which cathartics were chiefly relied on, a violent tenesmus took place, so that the rectum was corroded entirely through its coats, as appeared by dissection.

Might not a virulent acid, in this case, have been conducted from the stomach to the rectum, with the cathartics, and lodged in the rugæ or folds of that common sewer, so as to be productive of this direful effect? If so, would it not be much more eligible, in all cases of this kind, where the force of the disease is particularly exerted upon the stomach, to remove the offending virus by emetics, or to neutralize it, in that viscus, with alkalines; or at least to envelope it with oils, rather than to attempt an expulsion of this corrosive poison through the intestinal track, lest it should prove mischievous on its passage?

I do not mean to suggest that cathartics are useless in disease; but I maintain, that in all those distempers in which poison is either generated in the stomach, or admitted into that receptacle to its annoyance, emetics, alkalines or oils should *always* precede the use of intestinal evacuants.

I speak not only experimentally but *feelingly*, for in former years I have lost several patients in bilious colic, and in bilious and puerperal fevers, subjected to cathartic means, without previously cleansing the stomach, or neutralizing its acid contents.

For a few years past, however, I have adopted an opposite mode of practice in such cases; and I have the happiness to believe that it has rescued many from being poisoned even unto death.

Most certainly, if, by accident, arsenic, or any other acrid poison, should be taken into the stomach, we should choose to eject it by vomit, rather than to run the risk of giving relief, by having it conducted through the intestinal canal; and as the morbid condition of the stomach, in bilious fevers, has been found, by dissectors, to bear an exact resemblance to the ravages made in that organ by arsenic, I think we may safely and rationally conclude that a similar mode of treatment would be expedient. Indeed, if the case should have been neglected until inflammation had taken place in the stomach to any considerable degree, an emetic might then be ineligible. In a case thus circumstanced, oils, cool water and enemas, together with blood-letting and epispastics, would doubtless be the most salutary means.

It may be said, by some who dispense with emetics in colics and in fevers, on account of the irritable state of the stomach, that oily and alkaline cathartics may subdue and remove the offending matters. This, in slight cases of poisoning, has been found to be true. But when the stomach is considerably disturbed with the noxious virus, and threatened with inflammation and organic lesion, experience and observation have taught me that it is much safer to eject the venomous matter by emetics, than to confide solely even in alkaline and oily cathartics.

Moreover, I have found, in many cases of colic and fever, where the stomach was very irritable, that, after the operation of a suitable *alkaline* emetic, this irritable state has been appeased, and the stomach become retentive of other means, which before had been repeatedly ejected.

In July, a child, four years old, was attacked with pain in the bowels and vomiting, to which succeeded thirst and fever: it died on the sixth day. As the death of the child was supposed, by its parents, to be occasioned by worms, I was requested, by the attending physician, to examine it by dissection. On inspection, the villous membrane of the stomach was found inflamed, and besmeared with dark green matter. No worms were discovered, nor any other extraordinary appearance, excepting that the intestines were distended with air. Castor oil, rhubarb and magnesia had been employed, as also enemas.

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I attended an adult patient, in bilious colic, sixteen years since, who died on the seventh day. Upon dissection I found the villous membrane of the stomach inflamed and corroded, while the intestines exhibited no marks of disease, and no medicines were used in this case which could injure the stomach; for blood-letting, Glauber's salts, enemas, warm baths, and epispastics, were the chief means employed; with a view of removing spasms, and disburthening the *colon*.

If, then, these misleading terms, *bilious colic* and *bilious fever*, should be expunged, and terms more expressive of the nature and seat of these diseases substituted, great good, I conceive, would redound to mankind. Much light, also, might be thrown upon the minds of such practitioners as are not furnished with modern authors, who, by their laboured researches, have been enabled to detect the fallacy of these ill chosen terms.

With a view to enlighten the minds of my patients, in these diseases, I have, of late years, described their cases as being *a poisoned state of the body*. Antidotes, therefore, have been earnestly sought for, and taken with avidity.

It may be proper to observe, that in some slight cases of colic, relief was obtained from aloetic and mercurial cathartics, though not readily, and, in several of these instances, the disease returned twice in the same patient; so that recourse was finally had to emetics, alkalines and oils, for a radical cure. But not in a single instance has a relapse occurred when these remedies have been employed.

As preventives of this disease, I have recommended the use of lime-water, or an aqueous solution of alkaline salts, and none have been invaded with disease, who have used these means.

An intelligent sea captain informs me, that he had made a daily use of lime-water, in the West-Indies, instead of spirits, when the yellow fever prevailed, and was induced to believe that it prevented his being infected.

For several years past I have practised taking lime-water, or a solution of pearl-ash, in sick rooms, and have never experienced any inconvenience from the noxious effluvia, even when emitted from a putrifying corpse.

Moreover, I feel a firm persuasion, that if these health-preserving drinks were substituted for punch and wine, or other spirituous potations, especially in sickly seasons, there would be little danger of bilious fevers, or any other gastric diseases.

I am supported in this suggestion by Citizen Guinot, who

recommends, in strong terms, from his own experience, as well as that of others, the use of *fixed vegetable alkali*, as a preservative against the invasion of puerperal fevers, as well as in the treatment of them;* and every enlightened physician, at this day, I presume, considers puerperal fever, bilious fever, and bilious colic, as kindred diseases, depending upon one common cause.

Thus, gentlemen, as a faithful gleaner in the medical field, I have collected and described the foregoing cases, with as much accuracy as I possibly could, not hesitating to expose my own errors; and now submit them to your candid consideration.

If these cases, together with the annexed observations, should tend to awaken any one, who may still be dormant in the chains of ancient authorities, respecting the nature and treatment of these formidable diseases, so as to make improvements for the alleviation of human misery, I shall then be amply compensated for my labour.

ARTICLE IV.

CASE OF LUMBAR ABSCESS: *Communicated in a Letter from EDWARD CUTBUSH, Surgeon of the Frigate United States, to Dr. MITCHILL, dated July 9, 1801.*

JAMES Y——n, seaman on board the frigate United States, aged 27, was attacked, July 21st, 1800, with pain in his back and head; pulse full and quick. From this time to the 7th of August, the pain gradually extended towards his hip and thigh, which at length became very much swoln. During my absence from the ship, one of my mates, supposing it a rheumatic affection, very judiciously bled him freely, blistered the parts affected, and pursued strictly the antiphlogistic mode of treatment, without procuring any permanent relief.

August 10th. I visited him, and discovered a very evident fluctuation of pus, which had insinuated itself under the tendinous fascia of the thigh, and extended almost to the patella and inferior part of the sacrum: when he coughed, a fluctuation could be distinctly felt near Poupart's ligament, and his thigh appeared evidently enlarged after coughing. He has

* Med. Repos. vol. iv. p. 85.

frequent chills, and is very much troubled with a cough, pulse frequent, skin hot, especially the palms of his hands. On examining him, he reminded me of an injury he received in his back, by a fall into the fore-hold, which, he said, had been frequently troublesome to him.

Taking all the circumstances of his case into view, I had no hesitation in pronouncing the disease lumbar abscess; the integuments on the anterior part of his thigh being thin, I introduced a flat trochar, and discharged three half pints of mild inodorous pus; the canula was then *plugged*, and *left in the thigh*, and a flannel roller, applied moderately tight, from his knee upward.

11th. He coughs and expectorates frequently; the discharges from his lungs have a puriform appearance; pulse small, and 120 in a minute; he sweated profusely last night; tongue *clean* and *florid*. The plug being taken from the canula, half a pint of pus was discharged. Dressings as yesterday. Directed infus. cort. Peruv. cum. serp. virg. and elix. vitriol. to be frequently taken; half a pint of wine per day, and a light nourishing diet.

12th. He complains of great weakness; cough and expectoration continue; pulse 132 in a minute. One pint of pus was discharged from his thigh this morning. Medicine and diet continued.

13th. Cough continues; expectoration has more the appearance of pus; pulse still feeble, and very frequent; sweats profusely at night. This morning the pus flowed freely through the canula, but was not measured. Dressings as before. The infusion of bark, &c. did not set easy on his stomach; I therefore directed him to use a strong decoction of the bark of the* *wild cherry tree*, and to continue the elix. vitriol. wine and nourishing diet.

16th. The discharge of pus has diminished daily, since the 13th; the sides of the abscess appear to be uniting near the puncture. He says he has not sweated so much since using the *wild cherry tree decoction*; his appetite is increased, pulse not so frequent.

17th. On opening the canula, very little pus was discovered; from the firmness of the parts adjacent, I was convinced that the sides of the lower part of the abscess were united; therefore withdrew the canula, and closed the puncture with adhesive plaister; but a fluctuation of pus can be distinctly felt

* *Prunus Cerasus Virginiana*.

in the groin, and thigh, near the trochanter major, also near the sacrum. I again punctured the thigh, with a flat trochar, near the groin; half a pint of pus was discharged, the canula plugged as before, and a roller applied. Evening, being in pain, an opiate was given.

18th. Nearly half a pint of pus was discharged this morning; the bandage was applied somewhat tighter; medicine and nourishing diet continued.

19th. The cough is worse, he does not expectorate so freely; sweats less, but evidently appears to be gaining strength; half a gill of pus was discharged.

20th. His pulse has become more natural; a gill of pus was discharged this morning; the parts dressed as before, medicines &c. continued.

21st. He complains of pain in his bowels, which arises from their costive state; half a gill of pus was discharged from the groin. Directed a gentle cathartic, and after its operation to return to the use of the cherry bark decoction.

22d. The cough is better, pain of his bowels removed, appetite increases; sweated very little last night; nearly a gill of pus was discharged; applied the bandage tighter, with compresses on the glutæi muscles; he complains of a slight pain in his back, extending to the groin.

23d. He rested well last night, without sweating; appetite for animal food increases; a small quantity of pus was discharged this morning; bandage and compresses applied as yesterday, directed him to take beef tea, wine, &c. continued.

24th. Continues better.

25th. He very imprudently got out of bed last night and attempted to walk with crutches, which has produced a severe pain in his loins and groin; the discharge of pus is very small, the integuments of the thigh have become stiff; directed the parts to be bathed with sweet oil and laudanum.

31st. Since the 25th, he has gradually recovered his strength, pulse almost natural; when the canula was opened, a very small quantity of *serous fluid* was discharged; he is free from pain in his loins and thigh. I withdrew the canula and closed the puncture by adhesive plaister. Beef tea, wine and medicines, to be continued.

September 3d. His strength increases very fast, has no night sweats, coughs a little, which appears to be from habit; he walked yesterday without experiencing any inconvenience.

8th. He recovers rapidly, the puncture is healed; his good wife informs me, "*that he is getting strong in the back.*"

20th. He appears to be in a very good state of health, and solicits to remain on shore, which is granted him.

May 14th, 1801, I met with him in Philadelphia, in very good health; he informed me that he had not experienced any inconvenience from the disease.

ARTICLE V.

An ACCOUNT of a BILIOUS YELLOW FEVER which prevailed on Board the United States Ship Delaware, in the Island of Curacao, from the beginning of Nov. 1799, until the latter end of February, 1800: Communicated by SAMUEL ANDERSON, Surgeon's Mate.

PREVIOUS to entering upon a description of this fever, I shall make a few geographical remarks respecting the island of Curacao, give a short account of the weather which preceded and that which accompanied the disease, and relate a few other circumstances, which may perhaps lead to a discovery of its cause, which unfortunately I have not been able to ascertain, from a want of that experimental knowledge, by which only we can with certainty find out the cause of fever.

This account of the weather will not only be brief, but very imperfect, as it is not supported by a single thermometrical observation.

It is observed by Dr. Rush, in the fourth volume of his *Inquiries*, that those parts of the West-India islands which are removed from the neighbourhood of marsh exhalations, are uncommonly healthy. The island of Curacao has, until very lately, afforded a striking instance of this; for a confirmation of which I have the testimony of a considerable number of the most respectable inhabitants, and in particular that of Dr. Forbes, who I hope will ever do honour to the profession of Medicine. He informed me that during a residence of three years and upwards in that place, he had witnessed but few deaths, and those principally in consequence of old age; and that he had never known the yellow fever to prevail among the inhabitants.

The island of Curacao is thirty miles in length from east to west, and ten in breadth from north to south. It is diversified by numerous hills and mountains. Its soil in general is very poor and barren, and its vegetable productions very inconsi-

derable. Amsterdam, which is the only commercial town of the island, lies in 12 deg. north latitude, or thereabouts. It is divided by a bay or inlet which runs up a small distance. This bay affords a very convenient and safe harbour for vessels of the largest size. That part of it which divides the town, and in which the shipping lies, does not exceed, in breadth, more than eighty yards; but at the distance of half a mile, or three quarters, from its junction with the sea, it widens to a considerable extent, and is beautifully diversified by small islands. On the east side of this inlet, and about two hundred yards from the sea, is a large pond, which communicates with the former by a very narrow passage. It is about half a mile in length and a quarter in breadth.

The principal and oldest part of Amsterdam lies between this pond and the sea; but to a stranger the pond appears to occupy the central part of the town, as it is entirely surrounded by buildings. This pond has for some time been a receptacle for every kind of filth and nastiness, and in it I hope to detect that noxious principle which gave rise to the disease in question. The month of November, 1799, was uniformly warm and dry. The days were not succeeded by cool evenings, like the summer days of Pennsylvania. The drought was so great during this month, and for some time previous, that many of the poorest class of people suffered in consequence of a scarcity of water, as their principal dependence was on rain.

The beginning of December was uncommonly warm. The heat of the sun between the hours of 12 and 3 P. M. was almost insupportable. The atmosphere was not possessed of that elasticity, the happy effects of which (as Dr. Rush informs us) are experienced by the Pennsylvanians, except when the heat is accompanied with moisture and a south-west wind. In consequence of the want of this principle, the heat was oppressive and very distressing. Fountains, from which large streams of water had generally flown, were nearly dry. The island was nearly deprived of its verdure. Almost a total stop was put to vegetation. To horses and cattle this drought was very destructive, but to mules and sheep it was not mortal.

The ground became so heated as to cause the hoofs of many of the cattle to fall off, in consequence of which the proprietors were obliged to deprive them of their miserable existence.

That equilibrium which prevailed so generally in the temperature of the air, during the month of November, was un-

known in December. The nights were remarkably cool, and those were generally the coldest which succeeded the warmest days. During this month and the two succeeding months, the dews were uncommonly heavy, and often so great as to appear like a thick fog or mist. It was always heaviest about an hour before day.

I shall say nothing respecting the months of January and February, as they differed but little from December. All I shall say concerning the wind is, that in general it blew from east north-east—seldom exceeding, in variation, four points. Sometimes it blew with considerable violence, which was happily attended with a mitigation of the distressing sensations produced by the heat of the sun.

For a more easy discovery of the cause of this fever, it will be requisite to make a few remarks respecting that pond, the situation of which has already been described.

No current was perceivable in it, but at some times it was higher than others, in consequence of the flowing and ebbing of the sea. Though a strong breeze of wind commonly passed over it, it seldom affected the pond, owing to high land, and a number of large buildings, which stood to the eastward of it. From a want of the influence of the wind, from the stagnation of the water, and from the powerful operation of the sun on the vegetable matter with which this pond abounded in excessive quantities, there was a constant discharge of the most noisome effluvia—often so great as to produce nausea.

This noxious matter, after rising a few feet from the surface of the water, was arrested by the wind, and carried directly over our ship; in consequence of which the unfortunate crew of the Delaware were obliged to breathe an atmosphere replete with the seeds of fever.

With respect to the provisions of the ship, they were, in general, bad. The salt meat was often highly tainted, and far advanced in putrefaction. But little fresh meat could be procured, and that commonly unfit for use.

Vegetables were not to be had at any price. The water was bad, and often so offensive as to invert the peristaltic motion of the whole alimentary canal.

I shall conclude this relation of circumstances by observing, that during the prevalence of the disease a very nauseous smell was experienced between the decks of the ship, often so offensive as to produce vomiting when I was employed in administering medicines to the sick.

As very offensive effluvia, in general, prevail where a num-

ber of sick are confined together, it might be supposed that they proceeded from that source; but I am convinced that they did not, as they were noticed for some time previous to the commencement of the disease, for a considerable time after the sick were removed on shore, and though great pains had been taken to disperse them.

I shall now proceed to describe the disease as it appeared; and although it may not be defined in the most explicit terms, I hope a recollection of my inexperience will be a sufficient apology for its imperfections.

On the 16th of December, 1799, it commenced with uncommon violence and malignancy. In four days from the attack, more than thirty of our crew were labouring under its distressing symptoms. On the 20th, from an idea that the sea air might check its progress, the Captain was prevailed upon to go to sea; but in consequence of the increasing malignancy of the disease, we were obliged to return on the 24th, in a very alarming and melancholy situation. On the 25th, a very convenient and spacious building was hired for the reception of the sick, to which between forty and fifty of our crew were removed, myself included.

This house was situated on a small eminence adjacent to the sea; in consequence of which, and the judicious plan upon which it was constructed, there was a free and constant circulation of salutary air through it. The removal of the sick to this building was attended with the happiest effects. The disease, in many instances, from a very malignant aspect, was changed, comparatively speaking, to a form of the mildest kind.

The precursors of this fever were, depression of spirits; inactivity, and inability to perform motion; indigestion and nausea; perverted taste; dry, pale and contracted skin; yawning and sneezing; costiveness, and paleness of urine, &c.

Its attack was announced, in some, by a slight rigor; in others it commenced with only a slight sensation of cold. In some it was ushered in with a complete shivering; whilst, in a few, not the smallest sensation of cold was experienced.

There was a great variety in the state of the pulse in this disease. In some there was a fulness and tension, without quickness or preternatural frequency; whilst in others it was preternaturally frequent and quick, without either fulness or tension.

The intermitting pulse was evident in several cases, which I observed always to indicate a speedy recovery.

A remarkably slow and weak pulse appeared in a few. In one patient it beat but thirty-seven strokes in a minute, twelve hours before death. A dejected countenance, the eyes sunk in their sockets, with dilated pupils, and imperfect vision, coma, with cold clammy sweats, and cold extremities, were the concomitants of this state of the pulse, and commonly denoted the approach of death.

In some it was remarkably weak and frequent a few hours before death. In a few it was almost imperceptible; and in two it was totally so for many hours. In one patient it was full, tense, and preternaturally frequent, but one hour before death.

Hæmorrhages were unfrequent. In two cases grumous blood was discharged from the stomach in excessive quantities; and in one, dissolved blood ran from the mouth and nose in a constant stream. In a few it issued from the gums; and in one it flowed from the puncture in the arm for some hours previous to death. In three or four a bleeding at the nose alone occurred, but its duration was short.

So strongly did this symptom indicate the approaching dissolution of the patient, that I never after entertained an idea of effecting a cure. From a sympathizing disposition, and a desire of affording some consolation to my patient in the last hours of his illness, I often spent an hour or more in endeavouring to dissipate the gloomy apprehensions of his disordered mind. Often, with my fingers applied to the pulse, have I witnessed, with tears in my eyes, the rapid approaches of death, which at last cut the slender thread, and put an end to his miserable existence.

I recollect no instance of hepatic affection, except two or three convalescents, who complained of a dull pain in the right side, when they made use of too much exercise.

During my confinement I was informed of one case of pneumonic affection, which, I believe, was the only one that appeared.

A redness of the eyes, dilated pupils, pain in the head, nausea and vomiting, costiveness, &c. universally attended this fever, and plainly proved the existence of morbid congestion in the brain. The pain of the head was sometimes seated in the temples, sometimes in the back part of the head, but generally in the fore part.

Nausea or vomiting generally commenced with the fever. In common, nothing more than the ordinary contents of the stomach were brought up at first, but always after a few ef,

sorts were made, and the undigested aliment was discharged, a large quantity of green or yellow bile was evacuated.

When the disease commenced without a cold fit, the vomiting seldom came on before the third or fourth day, when the matter was generally black and very offensive.

A very distressing sensation of heat was commonly experienced in the stomach, in those cases attended with vomiting. It accompanied the vomiting, in a few, from the beginning; but generally it was not felt before the third day. No person, perhaps, suffered more with it than myself.

Costiveness was a very common symptom. In many the most drastic purges were administered without producing a stool, which could only be effected by the most powerful clysters. After two or three active clysters were given, they became copious. But few spontaneous stools came under my observation. In some they were excited by mild cathartics; and, in a few, a dose of emetic tartar had the happy effect of cleansing the whole alimentary canal. In a considerable number they were highly tinctured with green bile; whilst, in a few, they consisted of nothing more than the natural excrement of the body. In two cases they were black and very foetid, accompanied with flatulency and pain in the bowels. During the predisposition to the disease, the urine was clear and plentiful; but generally, after the fever commenced, it became high coloured, scanty, and was evacuated with considerable difficulty. In a few instances it appeared to be tinctured with blood. In many it was highly impregnated with bile, which plainly discovered itself in the smell and taste. After standing a few hours in a bucket, it became foetid, which I imputed to the bile with which it abounded. Though, in some instances, it was evacuated in very small quantities, and with the most excruciating pain, a single case of total suppression never came under my observation. Its scarcity was generally greatest, and the pain which attended its evacuation most severe, at the height of the fever. It assumed the dark colour in one instance.

But few patients were relieved by spontaneous sweats. In many instances the disease terminated with a copious artificial sweat. If the fever were not subdued before the third or fourth day, a sweating could seldom after be excited. One patient sunk under a profuse cold sweat.—They were always yellow.

The tongue, in most cases, was moist at the commencement. It seldom changed its colour before the third or fourth

day, when it became highly tinged with yellow. In the greatest number of those who died it became black. The gums also became black, and the teeth so loose in their sockets as to be easily picked out with the fingers.

No case of apoplexy or syncope came under my observation. Convulsions were common in the last stage of the disease. The disease, in one instance, commenced and terminated with coma. In one it appeared in the form of tetanus, with locked jaw. A distressing hiccup took place in a number. So great was the sensibility in one case, that the slightest application of the finger to any part of the body would excite the most excruciating pain. I witnessed several cases of preternatural excitement.

A delirium was not common. It occurred only in a few, in the last stage of the disorder. Many were remarked for an uncommon acuteness of understanding in the exacerbations of the fever. They would sometimes reason with astonishing force and perspicuity.

The pain in the head, back and eye-balls, was, in general, very distressing. In some the arms and legs suffered equally with the head and back.

A dimness of sight, with dilated pupils, was not uncommon. A great thirst generally attended the exacerbations. The appetite was always impaired while the fever continued.

In two cases the testes were considerably swelled and very painful. In both these the whole surface of the scrotum was excoriated, and covered with an uncommon discharge of matter, not only very offensive to the smell, but highly corroding to the adjacent parts. These were the only instances in which the glandular system appeared to suffer.

Though the skin was in general warm, it was preternaturally cool in a few. The yellow colour seldom appeared before the third day. In common, it was discovered first in the eyes and forehead. In some it appeared only in the eyes; whilst, in a few, it was never noticed in any part of the body.

I shall say nothing respecting the blood, as I had but few opportunities to observe its different appearances.

Eruptions of various kinds appeared. That which was most common, and which struck my attention most, was in every respect similar to musquitoe bites.

I shall be obliged to omit many phenomena which would have been of great importance in the history of this disease, in consequence of neglect and a treacherous memory.

Not only this, but every other part of the history of this malady, will be deficient in consequence of the length of my indisposition, and the reasons I have already assigned.

I shall now proceed to make a few remarks relative to the cure.

When I inform you that but twenty died out of one hundred and thirty who had the disease, it may possibly be thought that it was not so malignant as I have described it.

Certain it is, its mortality was not so great after the sick were removed to the hospital. This I ascribe to the efficacy of a salubrious sea air which circulated freely through that building.

An emetic was the first remedy prescribed, with a view of discharging the bile, with which the stomach abounded in excessive quantities. It was the opinion of the Surgeon, in which I conceive he was mistaken, that this superabundance of bile was the cause of the disorder; that the fever, and every other symptom, was excited by it; that it had been generating some time previous to the attack of the fever; and, unless it was evacuated, there was no possibility of effecting a cure. It was also his opinion that the seat of the disease was in the stomach, and that it was an error to consider it as existing in the sanguiferous system.

If, after one emetic had done operating, there was still a nausea and disposition to vomit, he would administer a second; and although one did in some instances effect a cure, when two were given the consequence was serious. In some convulsions were excited; whilst in others it produced violent spasms of the stomach and bowels, and a vomiting of blood.

A cathartic was the next remedy prescribed by the Surgeon, after the operation of which he generally gave nitre in small doses, and an anodyne at night.

I often urged the propriety of blood-letting, but it was seldom permitted to be tried. In some instances I had the pleasure to witness the happy effects of the loss of a few ounces of blood. So great and immediate was the relief in a few patients, that they fell into a profound sleep while the blood was flowing. More than once have I destroyed the disease by a single bleeding.

Blisters were sometimes very serviceable.

Brandy and laudanum, when applied to the external region of the stomach, had the happy effect of stopping a vomiting of blood in two or three cases.

ARTICLE VI.

Some EXPERIMENTS and OBSERVATIONS on the MODE of OPERATION of MERCURY on the BODY: Read before the Academy of Medicine of Philadelphia, November 19, 1798. By Dr. PHILIP S. PHYSICK.

IT has for a long time been a common opinion among physicians, that the different preparations of mercury are effectual in producing salivations, or in curing lues venerea, and some other diseases, only when they have been absorbed and carried into the blood. So confident were they formerly of mercury entering the system, that it was even believed, in some instances, to have been deposited in the bones in the form of quick-silver. This latter opinion has been sufficiently disproved by accurate anatomical investigations; though the former continues still in vogue, and is generally believed.

Several years ago, and not long after my medical studies were commenced, a case occurred, which has since raised some doubts in my mind on this subject, and has led to a further inquiry. A young man, who had contracted a gonorrhœa, took occasionally cathartic pills, composed chiefly of jalap with a very small addition of calomel. After he had taken several doses of these pills, his mouth became suddenly very sore, and a copious spitting was produced. He was greatly alarmed at the idea of a salivation, and reproached me with having given him an unnecessary quantity of mercury. I assured him he had taken but very little of that medicine, and that, as what he had taken must have been purged off, it was very doubtful whether the soreness of his gums, and spitting, were mercurial or not; for I had been taught, that whenever mercury proved cathartic by itself, or was joined with purgative medicines, it would all pass off with the alvine discharge; and that, consequently, there would be little or no reason to apprehend a salivation from it. To ascertain, however, whether the mercury had occasioned the disease in his gums or not, he was desired to keep a guinea in his mouth all day, considering it probable that if the spitting was occasioned by the mercury, the colour of the metal would be changed. I was much pleased next morning to find it unaltered, and my patient was quite contented with the result of the experiment. My own mind, however, was by no means satisfied; not only

because I was at a loss to account for the sore mouth without attributing it to the calomel, but also because it resembled, in every respect, that disease in the mouth which I had several times before seen occasioned by mercury. The experiment with the guinea, therefore, was repeated on two persons who were labouring under salivation from the use of mercurial ointment, and, much to my surprize, the gold was still found unchanged in its appearance.

About a year ago a clean piece of gold was immersed in some blood drawn from a man who had taken a considerable quantity of calomel, and also used mercurial ointment, and in whom salivation was just beginning. It was kept in this blood two days, and frequently stirred, but it still suffered no change in its colour. Next it was immersed in a considerable quantity of his saliva, with the same result. Similar experiments were made with clean pieces of silver and copper, but no change appeared in either of them that could be attributed to mercury, because the same changes of colour or tarnish took place by immersing these metals in the blood and saliva of persons who had not used any mercury.

Being desirous of having some further tests used, the above observations were communicated to Dr. Seybert, who obligingly undertook not only to repeat the experiments with the gold, but also to make several others on the blood and saliva of a patient under similar circumstances with the one last mentioned.

"In the month of November, 1797," says Dr. Seybert, "a piece of polished gold was immersed in the saliva of a patient who was under the operation of mercurial medicines. It remained therein during several days, and suffered no evident change whatever.

"November 26, 1797. A piece of gold was immersed in the serum of the blood from the same person, and was not altered.

"November 27. I made a paste with finely powdered charcoal and some of the above-mentioned serum. A piece of copper was imbedded in said paste, and then placed in an Hessian crucible in the fire. It remained there until the coal became ignited, and was allowed to continue so during ten minutes; it was then removed from the fire, and the copper had suffered no alteration except from being heated.

"A quantity of the same serum was poured into an oil-flask, in the neck of which a piece of polished gold was suspended. The flask was then placed over the fire: the liquor

boiled and evaporated. A spongy mass remained; but the gold suffered no alteration, neither did another piece of the same metal, placed over the mouth of the flask.

"Lime-water did not alter said serum when mixed with it.

"Ammoniac did not alter its appearance.

"Diluted muriatic acid produced a copious white precipitate.

"Diluted nitric acid produced a more copious precipitate than the former, which appeared similar in both instances.

"The muriate of ammoniac produced no change, neither did the muriated barytes.

"The nitrate of silver produced a copious white precipitate.

"The prussiate of pot-ash effected no change.

"The solution of arsenic did not alter it.

"Similar experiments to the above were performed on the serum of the blood obtained from a person not affected with mercury, and the results were the same in both."

The introduction of mercury into the blood-vessels through the absorbents (an hypothesis which appears to have been admitted by physicians without much examination), is at least rendered very improbable by the above experiments.

It may, indeed, be said, that the mercury is combined with the blood in such a peculiar way, that the above means have not been adapted to detect it; but such an objection must be granted to be a very lame one, because it is hypothetical.

There is no fact with which I am acquainted to prove that mercury is even admitted into the absorbents; but if this could be ascertained to be the case, it would by no means be just to conclude that it must pass on through their trunks unchanged, because the absorbents, in common with the stomach, are probably possessed of a digestive power; and I should be much disposed to believe, that if mercury were detected in the absorbents, and not found in the blood-vessels, it would only be a circumstance, in addition to many others, to prove the lymphatics to be possessed of such a power.

It is a fact well ascertained, that the process of vegetation has the power of forming different metallic substances out of air and water; and it appears to me highly probable, that the digestive process of the stomachs and absorbents of animals have the power of decomposing small quantities of them, and reducing them back to their original elements.

On what principles the opinion is founded, that mercury must enter the blood to produce its peculiar effects, is not very evident; for my part, I see no reason why its operation

should not be explained on similar principles to those on which the action of other powerful remedies appears to depend. No one now suspects that opium, tobacco, aq. lauro-cerasi. Peruvian bark, &c. enter the blood-vessels; and yet these substances act extensively and powerfully on the body.

I know that it is very difficult, if not impossible, to explain the peculiar effects of mercury on the system, but I believe that difficulty would not be diminished by supposing it to be mixed with the blood.

Every article of the *materia medica* produces at first local effects, or stimulates the part to which it is immediately applied; and, in consequence of this local impression, the actions of neighbouring or distant parts are altered sympathetically. I am disposed to believe that mercury acts in this way, whether it be applied to the stomach or the skin.

It is not mercury only that produces similar effects, whether applied to the stomach or skin: opium, strong liquors, Peruvian bark, and cantharides (in one circumstance) have the same quality.

I shall next mention several circumstances which prove that the salivary glands are capable of being stimulated by impressions made on distant parts. Thus we observe,

1. That a copious secretion of saliva is generally excited by the nausea produced by the irritation of an emetic in the stomach.

2. Ideas often increase the action of the salivary glands.*

3. Pregnancy, in some women, occasions a salivation sometimes of several weeks continuance: and,

4. I have observed a copious spitting, with swelled gums, ulcerated cheeks, and loose blackened teeth, in three different persons who had never used any mercury. I have attributed these symptoms to acidity of the stomach; because, by giving a solution of salt of tartar, after trying, without effect, several local applications, they were soon cured.

* Every one is acquainted with the effects of seeing savoury food; but the following case is a striking instance of the influence of the mind in increasing the salivary secretion. In the year 1790, a male patient in St. George's Hospital (London), who was using muriated barytes, took up an idea that his medicine was mercurial. In the course of two days he began to spit, and discharged near a pint of saliva per day for four days; when, to ascertain whether this was purely the effect of his mind, or whether the medicine had any influence, I told him his medicine must be changed, and that I would give him another to check the spitting. The bottle was taken away, but the same dose of muriated barytes given, disguised by a small quantity of spermaceti mixture. The effect was, that the salivation ceased in two days.

ARTICLE VII.

OBSERVATIONS upon the DISEASE produced by the BITE of a MAD DOG: Communicated by JAMES MEASE, M. D. to Dr. MILLER.

THE accounts of cases of the disease arising from the operation of the canine poison, which were published in the last number of the Medical Repository, suggest some observations, which I think it more useful to send you without delay, than to keep until arranged and connected with others in a more systematic form.

The first fact which the excellent case related by Dr. Physick assists in proving, is, *that the size of the wound is no way connected with the time of the attack, nor with the fatality of the disease.* The wound which gave admission to the virus in York's foot was so small, that when questioned about it in my hearing, he said, "Oh, it was nothing—a mere scratch near my toe." Dr. David Ramsay, of Charleston (S. C.) communicated a similar fact to me in May, 1796. The person was bitten fifteen months before the disease appeared, and the wound was so slight, that the circumstance of the bite had entirely escaped the memory of the sufferer and family, and was only brought to their recollection by the mention of it to them.

2. The case of York proves, *that the late or early appearance of the disease is not regulated by the proximity to, or distance of the bitten part from the head.*

As far as I can find, I stood alone for some time in this opinion, which I first published in my Inaugural Dissertation, May, 1792. The contrary opinion is delivered as an axiom by all the systematic writers on the disease I have met with, from Cælius Aurelianus down to Sauvâges. It is even admitted in the report of Dr. Hunter on the disease, to the Society for promoting Medical and Chirurgical Knowledge.* In York's case we find a boy bitten in a part the most remote from the head, attacked in about five weeks; while others, bitten nearer to the head, remained much longer well. Thus J. Groves,† who was bitten in the breast and neck, was not affected until the ninety-sixth day. Johnson,‡ bitten on the

* Trans. of Soc. &c. vol. i.

† Hamilton on Hyd. vol. ii. p. 292.

‡ Med. Facts, vol. ii.

cheek, was attacked in three months. Billass,* bitten in the thumb, enjoyed perfect health until the nineteenth month; and Ryder,† bitten in the wrist, was attacked in eighteen months. If, however, these instances are only deemed exceptions to a general rule, which may nevertheless be well founded, let the reader turn to the second volume of the remarks of Dr. Hamilton on the disease, and he will find a mass of evidence against which there can be no resistance.

3. The case adds one more proof to many others on record, of the *falsity* of another opinion delivered by some systematics; viz. *that the danger of the bite is proportioned to the advanced stage of the animal's disease*. York had been teaching the dog (apparently in perfect health) to fetch and carry for two hours before the cur gave the bite. Similar cases are recorded, where not the smallest indisposition was perceived in a dog before the moment of his inflicting a bite. The virus appears to be no more exalted or active when the animal is near death, and raving, than during the first moments of indisposition. The chance of disease, therefore, from the bite received at any stage, is equal. It is a consolatory circumstance, however, and ought to be generally known, that, fatal as the disease hitherto has been when it came on, yet the proportion of those who are attacked is trifling compared to those who are bitten.

4. Is it fair to adduce the case of York, as an additional proof to the many I formerly quoted of the failure of the depleting plan of cure?

Hitherto bleeding has been generally prescribed in this disease, because Boerhaave pronounced it, "*Summe inflammatorius*," and because, in case of a failure in the attempt to cure, *prudent physicians* have found it much more to their interest to be able to shield themselves under the sanction of the fact that their remedy has failed in the hands of the greatest physicians, than to attempt the cure by a new plan. But in the present case the remedy was prescribed by a physician who is accustomed to view the welfare of a patient as the only object of consideration; and if ever a case of the disease in question occurred, in which the plan was justified by the mode of attack, and by the symptoms, that of York was one. The disease made its attack in the form of fever: the pulse, in particular, was "full, hard, and preternaturally frequent, and

* Phil. Trans. 1737.

† Lond. Med. Journal, vol. viii.

the skin hot and dry." On the afternoon of the third day, when I saw him, his tongue was white and furred, his pulse beat 80 in a minute by my watch, and was tense and full; and yet the blood which he lost had no effect in diminishing the violence of the symptoms. He lost sixty-two ounces, at four bleedings, in the course of twenty-four hours.

The slight appearances of redness, discovered upon dissection, in the trachea, and at the great curvature of the stomach near the pylorus, permit no deduction as to the theory of the disease. I have elsewhere noticed this appearance, which is merely *erysipelatous*; and I accounted for it, in part, by referring it to the irregular determination of the blood throughout the body, and to the *irritation* of the nerves of the part, which, by being communicated to the arteries, may increase the rapidity of their contractions, and create the superficial redness taken for a true active inflammation.

This irritation I supposed to result from the action of the virus generally upon the nerves, and particularly upon those of the stomach; but I am now disposed to ascribe its increase to the causes hinted at by Dr. Physick, viz. the "constant spitting and excessive thirst," and to answer in the affirmative of the question he proposes, whether these causes "do not sufficiently account for the slight inflammation observed in the stomach on dissection." My reasons are as follow:

1. "We know," says Dr. Physick, "that in animals starved to death the stomach is found much inflamed, and it must be remembered that want of drink is far more intolerable than want of food."

2. Dr. Physick informs us that he was distressed with a burning sensation in his stomach, in consequence of spitting out his saliva, while in attendance at the City Hospital, during the epidemic of 1798; and adds, that his colleague, Dr. Cooper, experienced the same sensation, the cause of which was ascertained beyond a doubt, by several experiments. Now, in the disease in question, a constant rejection of saliva is a more characteristic symptom than the dread of water, and starvation almost literally occurs during the short continuance of the sufferer's existence; for the action of swallowing is so distressing, and his feelings so alive to every source of irritation, that he seldom takes either liquid or solid during the violence of the complaint.

3. The following fact was lately communicated to me by a respectable physician of this city. A lady was affected by swelled tonsils to such a degree as to render the operation

of extirpation necessary. The inflammation and swelling which ensued almost entirely suspended the power of swallowing, and the saliva was constantly discharged at the mouth. On inquiry being made as to the seat of the pain expressed in her looks and by her actions, she pointed to her stomach; and, after she could speak, she declared, that during the continuance of the inability to swallow, her pain and distress arose chiefly from the burning sensation in her stomach.

4. Mr. A. Cooper* says he found the stomachs of several mad dogs inflamed after death; and we know that the discharge of saliva by them during life is very great, and that, when mad, they seldom eat or drink. I suppose that the gastric juice not being diluted as usual by the saliva, and the stomach having no food to sheathe it from the action of that powerful liquor, feels the effect of it in the burning sensation mentioned.

Bleeding, it appears, was used in the case of York to a degree which many will think very liberal, and fully adequate to the cure of most, if not all, common inflammatory diseases. But its respectable advocate will probably say, that the delay of twenty-four hours, which took place before any blood was taken away, permitted the disease to gain strength, which the subsequent attempts to cure could not reduce; the stimulus of the canine virus upon the system being so great as to render an early loss of from *two to three* hundred ounces necessary to cure the disease. Those, therefore, who adopt the theory of the inflammatory nature of the complaint, will do well to attend to the important injunction of *early and copious bleeding*.

Since the publication of my late pamphlet upon the disease, I have met with some additional authorities in favour of the practice of exciting a strangury, which I recommend as a cure. In a paper by M. Andry, in the first volume of the *Memoirs of the Academy of Medicine of Paris*, several well authenticated cases are related of the efficacy of cantharides, and of the species of *Scarabæi* called in France *Hanneton*,† and *Vers de Mais*,‡ even when given after the disease appeared to be far advanced. In some, it was remarked, a discharge of bloody urine followed the exhibition of these remedies. But this circumstance, though alarming to the pa-

* Med. Records and Researches.

† *Scarabæus Vulg. Rufus.* (Lin.)

‡ *Proscarabæus.* (Lin.) *Bombarde Dict. Hist. Natur.*

tient and friends, is not dangerous when brought on in this way, and ought not to prevent our using the remedy. We frequently see a similar discharge follow the application of several blisters at the same time, without any bad consequences. Demulcent drinks and the warm bath will soon give relief. The admirable case related by Dr. Brown, of Kentucky,* of the cure of tetanus by the exhibition of the tincture of cantharides, proves the little danger to be apprehended from the occurrence mentioned.

In the letter of Dr. R. Pearson, inserted at page 77 of the present volume of the Repository, Dr. Rush's idea of the complaint is evidently mistated, when it is said, that "the canine rabies might not unaptly be denominated *typhus hydrophobicus*." By terming the disease produced by a mad dog's bite a "malignant fever," Dr. Rush does not mean typhus, but *synochus* of Dr. Cullen; that is, a fever first inflammatory, and afterwards putrid (as commonly termed).† The conclusion, therefore, of Dr. Pearson, that venesection must be rejected, is erroneous, because it is founded upon a false assumption, a misnomer. Agreeably to the ideas entertained by Dr. Rush of a malignant fever, and which have a reference to the inflammatory malignant fevers that prevail in the summer and autumn in the United States, the debilitating treatment he advises is perfectly consistent. I agree, however, with Dr. Pearson in rejecting the practice.

Dr. Pearson prefers caustics to the arms and thighs to blisters, because "they produce a more powerful and more permanent action on the surface of the body, and, at the same time, are unattended by the peculiarly distressing irritation on the urinary passages which the cantharides occasion—an irritation carefully to be avoided in this disorder."

If caustics would have the desirable effect of relieving the throat, I also would prefer them to blisters; but I much doubt their superiority in this respect; and as to the danger of a strangury from the use of the latter, this, so far from being a reason for omitting the remedy, is the very effect I wish to produce: hence I would apply blisters to the bitten part after

* See Med. Repository, vol. iv. p. 337.

† Dr. Rush neither admits the existence of putridity in the blood, nor uses the term putrid fever, and substitutes in its room the "gangrenous state of fever;" for, says he, "what appear to some physicians to be signs of putrefaction, are nothing but the issue of a violent inflammation left in the hands of Nature, or accelerated by stimulating medicines."

[Works, vol. iv. p. 158.]

enlarging it and filling it with cantharides, and would follow Dr. Brown's judicious practice, successfully pursued in tetanus, and give the tinct. cantharid. in the dose of ten or fifteen drops every hour, until not only a strangury was produced, but also until some irritation appeared in the stomach and bowels. In the case related by Dr. Borrowe, page 73 of this volume, evident good effects, though of short duration, succeeded the application of blisters.

Of caustics, however, I think well, if applied to the bitten part, and even after the disease has appeared. When a locked jaw proceeds from a wound in the foot or hand by a rusty nail, or other pointed instrument, we see the most happy effects from the practice of raising an irritation in the parts by means of salt, hot turpentine, or Spanish flies; and from the close analogy subsisting between the two diseases, I entertain not the least doubt as to the relief which the throat would derive from a similar irritation raised in the part bitten by a mad dog: from the quick and powerful action of caustics, I think them highly worthy of use when expedition is required.

The case treated by Dr. Borrowe does not militate against the efficacy of the excellent plan of ablution as a preventive, though early instituted. It would have been well to have continued it for a longer time, and the wound ought to have been previously enlarged to permit the penetration of the water to the sinuosities made by the dog's tooth, as recommended by Dr. Haygarth. A disease which appears in all the intermediate periods between *ten days* and *four years* (as I shall presently show) must render an internal preventive remedy useless, for it is clear that the system could not be kept under the impression of any remedy during that long period, to a degree sufficient to counteract the effect of the canine poison. Numerous records of cases, beside that by Dr. Borrowe, prove that the use of mercury internally, even to salivation, and of other remedies, do no good as preventives. We have only to depend upon an early excision of the part if practicable, or otherwise upon washing out the virus by *long continued streams of water from a tea-kettle, and putting an issue in the part*. The tincture of cantharides could not be said to have had a fair trial. It was given to the extent of thirty drops every hour, but not until the fourth day of the boy's illness. No sensible effect was produced, though the medicine was continued through the day. A more early exhibition would probably have enabled us to determine whether

that remedy would not succeed as well in the disease produced by the bite of a mad animal as in tetanus.

Dr. Hamilton has fixed upon the tenth day as the shortest period at which the disease has ever appeared, and nineteen months as the longest interval that has hitherto been known to take place between the bite and the attack. But I have lately been informed of a case in which this destructive virus lay dormant four years and three months before it began to operate. I wrote to the boy's father, Mr. Isaac Pyle, of Bethel township, Delaware County, Pennsylvania, to request the particulars, and was favoured with the following account:

On the 14th of the seventh month (July), 1797, Mr. Pyle's son, about fourteen years of age, was sent for the cattle, and, while crossing a fence, a cat seized his great toe; and he was not able to disengage her until after descending from the fence, and placing his other foot upon her, when he drew the toe out of the mouth of the animal, but not without having it completely divided by her teeth. Being armed with a club, the youth killed the cat. Upon a supposition that the cat was mad, the nostrum of the Goodman family of this city was taken, but, as will appear, with as little success as attended the host of other absurd compositions to which lives in all countries have been sacrificed. No symptoms of indisposition appeared until Saturday, the 19th day of the eleventh month (Nov.), 1800. He was then seized with a pain in his hip, head and back, and appeared dull and heavy. Occasionally he would fall asleep in his chair; and though, while in this state, his respiration was so loud as to be heard out of doors, yet, when awakened, he could scarce be brought to believe that he had been asleep. He was extremely irritable, and, when taken hold of, would start and cry out as if frightened. His mouth was filled with saliva. He had a strong aversion to drink, and, when it was offered to him, would appear as if about to be attacked with convulsions. In this state he continued until the following Sunday evening, when he became occasionally delirious, had a wild look, talked much, and declared his belief that he should not long survive. The following day he appeared more calm; but on Tuesday, about noon, he fixed his eyes to the ceiling, and appeared as if he beheld something which greatly alarmed him, and which he could not be prevented from viewing. He continued in this way until the next morning, *when, after twice discharging matter resembling strong coffee*, he expired.

The above case, which I believe to have been produced by

the operation of the canine virus, affords the longest interval between the bite and death of the person bitten, of any well authenticated instance on record. It will long be a problem of difficult solution to explain the reason of the very irregular operation of this subtle and powerful poison, and to determine upon what principle it happens that it remains dormant in the part of its original insertion during four years; or, if the virus be absorbed, that it should so long circulate with the general mass, and not be excited into action by any of the various causes which, in constitutions apparently similar, occurred and operated in ten days after the bite. It is much to be wished that the practitioners of medicine in the United States would turn their attention to the consideration of this truly awful disease, and make up their minds as to the mode of treatment they are determined to pursue; and, when a case occurs, to give it a fair trial, avoiding, if possible, the shackles and feeble practice resulting from consultations. In order to secure a prompt and speedy application of remedies, it would be well for the physician of the person who may receive the bite to watch carefully the first appearance of indisposition, and instantly to apply his method of cure, for the disease runs its course so rapidly that not an hour ought to be lost. I wish much to see the cantharides tried; and, surely, in a disease hitherto almost universally fatal, we are justified in attempting a cure by a plan in favour of which analogy, authority, and the well known laws of the system, plead so powerfully. Let the case be fairly and concisely stated, whether successfully treated or the contrary. In this way, and in this way only, shall we arrive at some certain mode of cure. Those who may finally be the happy instruments of disarming the awful disease of its terrors, will justly merit the thanks of their own country, and of the world in general; yet others who follow the example of the great father of medicine, and, by a narration of their failure in a cure, teach us what road to avoid, will also come in for a large portion of the honourable reward.

ARTICLE VIII.

Some REMARKS on the IMPORTANCE of the STOMACH as a CENTRE of ASSOCIATION, a SEAT of MORBID DERANGEMENT, and a MEDIUM of the OPERATION of REMEDIES in MALIGNANT DISEASES.

By EDWARD MILLER, *M. D.*

IN the second volume of this work, page 409, first edit. I undertook to lay before the public some "*Cursory Observations on that Form of Pestilence called Yellow Fever.*" In an attempt to pursue the analogy between febrile miasmata and poisons, I endeavoured to prove that the former are commonly received into the stomach by the swallowing of saliva in which they had been lodged, and that by coming in contact with its internal surface, they produce the affections of that organ and of the upper intestines, which are frequently indicated by the symptoms of yellow fever, and afterwards, in fatal cases, laid open to view by dissection.

The phenomena of hydrophobia, and particularly those of two cases which occurred in this city, and are related at p. 73 and 75 of this volume, have induced a change of my opinion as to the mode of operation of febrile miasmata on the stomach, and a conviction of the necessity of referring many such appearances of derangement in that organ to the influence of a law of animal nature, which seems to bear a very interesting relation to the theory, prevention and treatment of malignant fevers. To correct the mistake, to state what now appears to be a more accurate view of the subject, and to point out some of the important and practical consequences which are supposed to result from this opinion, are the objects of this paper.

The cases of hydrophobia just referred to, presented complete examples of malignant fever. The mode of accession, the febrile symptoms, the progressive extension of disease from a few to many parts of the system, till at length all the important organs were deeply involved, the gradual and uninterrupted exhaustion of the principle of life, and the period of the fatal termination, all corresponded exactly to this character. The vomiting of black matter* in one instance, and the yel-

* I am aware that this symptom may be ascribed, at the first view, to the large and frequent doses of tincture of cantharides prescribed in that case. The short space of time, however, in which the black vomiting

lowness of the skin in the other, after death, were sufficient to impress the minds of all who had been accustomed to see that form of malignant disease which has so often prevailed in the cities of the United States for the last ten years.

The analogies between hydrophobia and malignant fever have been so ably exhibited by Dr. Rush,* that it is unnecessary for the present purpose further to prosecute that subject. Of the various points of similarity between them, which he endeavours to establish by a recurrence to facts, none seems to be more important and convincing than the condition of the stomach and other portions of the alimentary canal, as well as of several other viscera, when laid open to inspection by the dissection of bodies dead of these diseases. If the poison of a mad dog producing hydrophobia were to gain admittance into the body through the alimentary canal, as is supposed, with great probability, in respect of febrile miasmata, the similar disorganization of that canal, and especially of the stomach and duodenum, to what is discovered by dissection, after cases of malignant fever, would not so pointedly demand attention nor offer instruction. Every person would explain the

came on after the first doses, and the total absence of all signs of the more usual effects of that agent on the system, compel me to reject the opinion.

But admitting, for argument's sake, that this instance of black vomiting, and of disorganization of the stomach, was the consequence of using the remedy in question; it is well known that the vomiting of similar matter, as well as unequivocal appearances of inflammation and derangement of the stomach after death, are frequently observed in cases of hydrophobia.

Mr. John Hunter informs us, that in the examination of the bodies of those who have died of hydrophobia, "an appearance has, in general, been seen on the inner coats of the stomach, near the cardia, similar to what is found in the bodies of persons who have had slight inflammation, that is, a greater number of red vessels with small streaks of red blood. In some instances there has been an increased vascularity of the *pia mater*, or slight watery effusion on the surface of the brain. In some dogs that died of the disease, the appearances upon the inside of the stomach were similar to what have been already described; but there was no unusual fulness discovered in the vessels of the brain, or its membranes."—*Transactions of the Society for the Improvement of Medical and Chirurgical Knowledge*, vol. i. page 311.

Dr. Baillie observes (*Morbid Anatomy*, p. 68), that "in opening the bodies of persons who have died from hydrophobia, the inner membrane of the stomach is frequently found inflamed at the cardia and its great end."

Authorities in proof of this condition of the stomach, found after death from hydrophobia, might, if it were necessary, be multiplied to any extent. Many likewise might be adduced of the discharge of a dark coloured matter, by vomiting, towards the close of that disease, and where nothing had been taken which was calculated to induce inflammation and its consequences.

* *Medical Inquiries and Observations*, vol. v. p. 211.

appearances by referring them to the primary operation of a poison coming in contact with this irritable surface. But when we find effects so exactly similar arising from different kinds of noxious matter, conveyed into the system by different passages, one of which is known to be often at a great distance from the parts which exhibit this morbid derangement after death; will it not follow that such parts possess, in an extraordinary degree, the property of attracting and fixing disease in themselves, with the effect of diffusing it afterwards, as will be presently seen, to other parts of the body?

This wonderful property is possessed by the stomach, and some other portions of the alimentary canal, in a degree much beyond the other parts of the body. The importance of the stomach to animal life may be inferred from its being much more universally found in the structure of animals than the brain, heart and lungs, and from the deprivation of it being much more universally and speedily fatal than that of any or all of those vital viscera. *In a state of health, the functions of the stomach, as the principal organ of assimilation, will give it a high rank among the parts of the system which support life. But it is in diseases that its principal powers and relations are unfolded to view. In fevers it is probably, in most instances, the first part affected, as it commonly affords the first notices of the approaching mischief. From its susceptibility of morbid action by noxious powers applied immediately to its surface, or to distant parts of the body with which it maintains sympathetic connection, it becomes not only the introducer of such action to the vital organs, but a centre of association, and an index of the most interesting circumstances concerning the accession, progress, remission, crisis and cure of diseases. The extreme mobility of this viscus would be more generally felt if it were not for that unconsciousness of irritations in it which nature has ordained. Even mustard, pepper, salt, and other acrid substances, taken into the stomach, produce no sensation except a pleasant warmth, unless the large quantity of them lead to sickness and vomiting.

No part of the system possesses so wide a range of sympathy as the stomach. The phenomena of diseases demonstrate every day its connection with the heart and arteries, the brain, the lungs, the skin, the kidneys, the uterus, &c. The due understanding and recollection of these sympathies is not only of great importance in detecting the seats, causes and nature of diseases, but quite as much so in directing the means of cure.

In consequence of this centrality of association and sympathy, the stomach is subjected to peculiar degrees of injury and derangement by diseases. It may be safely affirmed, that no part of the body is so liable to disorganization by malignant fevers as the alimentary canal, and especially the stomach and duodenum. Morbid dissections so generally afford proof of this, that it would be improper to detain the reader by a recital of particulars.

Such considerations as these, in addition to a great many others, seem fully to support the doctrine that fever is principally a disease of association, and that the sympathetic theory of it is better adapted than any hitherto known, to explain the various phenomena, and to point out the most appropriate and efficacious modes of treatment. It affords strong confirmation of this doctrine, that the stomach, the most associable part of the system, is the first and principal sufferer from the noxious causes which produce fevers; and that afterwards, in succession, the organs possessing the closest sympathetic relation to the stomach, such as the heart and arteries, the brain, the lungs, the skin, &c. are, precisely in the order of their sympathy, the most exposed to be involved in this morbid connection.

The mistake referred to above, in my paper concerning yellow fever, consisted in adopting the opinion that the gastric affection in that disease ought to be attributed to the primary and immediate action of the febrile poison, swallowed with the saliva, upon the inner surface of the stomach and duodenum. This was undoubtedly a hasty and incorrect view of the subject. The phenomena of hydrophobia, one of the most exquisite and deadly forms of malignant fever, afford ample means of correction. In this disease, the virus received on any part of the external surface of the body, at the most distant point of the upper or lower extremities, after lying dormant awhile, like the miasmata of fevers, though generally for a longer time, excites the stomach into violent morbid action, and then, successively, all the important and vital parts of the system. The manner and degree in which this morbid action disorganizes the texture of the stomach, and occasionally of the brain and other organs, may be learned from the dissection of bodies which have died of hydrophobia, as completely as in cases of other diseases commonly called malignant fevers.

So far as hydrophobia from canine poison may be conceived to be of the nature of malignant fever, the distinction

between the consequences of the primary and secondary modes of affecting the stomach by febrile poisons is either weakened, or falls entirely to the ground. Dr. Darwin, whose theory of fever will remain an everlasting monument of his penetration and the comprehensiveness of his views, relies on that distinction to explain the difference between the mild and confluent small-pox. Thus he supposes, "that in the distinct small-pox the stomach is affected secondarily by sympathy with the infected tonsils or inoculated arm; but that in the confluent small-pox the stomach is affected primarily, as well as the tonsils, by contagious matter mixed with the saliva and swallowed." With all possible deference for such authority, it seems to be difficult to admit this doctrine without many exceptions. There can be no doubt that the inoculated small-pox sometimes proves to be confluent, where no suspicion could exist of contagious matter being admitted into the stomach, and primarily or immediately affecting that organ. Would not Dr. Darwin have been nearer the truth if he had contended that the force of morbid action, which is sympathetically conveyed from the inoculated part to the stomach, and thence extended, by association, to other parts of the system, may, according to constitutional and other circumstances, be sufficiently diversified to produce all the varieties of the distinct and confluent disease?

The phenomena of hydrophobia from canine poison, of the diseases produced by the bites of certain serpents, and of confluent small-pox when it happens to be the consequence of inoculation (all which may be regarded as so many instances of malignant fever), serve thus to show, in a convincing light, the wonderful mobility and associability of the stomach, as well as of the other vital organs with which it is especially connected by sympathy, and thereby to lay a broad foundation for the sympathetic theory of fever.

The doctrine of fever, therefore, which appears to be most consistent with the phenomena, so far as they hitherto have been observed, is this:—Certain noxious powers, called miasmata, contagions and poisons, find admittance into the system through the mouth and nose, or the pores of the skin, or they are inserted by the bite of a rabid or venomous animal. Whether miasmata and contagions, entering by the mouth, exert their action chiefly on the lungs or stomach, cannot yet be certainly decided. It is not improbable that differences in the ensuing disease may often arise from the various degrees of susceptibility in the several organs which give reception to the noxi-

ous matter. But whatever be the mode or place of entrance, the noxious matter, after a longer or shorter time, excites the system to a state of action which is morbid both in kind and degree. The stomach, the most moveable and associable of all the organs of the animal body, is the first to experience this excitement in itself—the most adapted, from its extraordinary powers of sympathy, to extend it to other viscera—and the most liable to sustain the burthen of the disease, and to undergo the most fatal disorganization. To the heart and arteries, to the brain, to the lungs, to the skin, and occasionally to many other important parts of the system, is this morbid excitement communicated by means of the associative influence of the stomach. Hence all the variety of congestion, inflammation, effusion, engorgement, gangrene, and other modes of derangement which dissection exhibits in the stomach, intestines, brain, lungs, and other viscera of such as die of malignant fevers.

If this view of the nature of febrile diseases be just, it will serve to direct the attention of the physician, in an especial manner, to certain objects respecting the prevention and treatment of them, which cannot be too studiously regarded.

Admitting that morbid action in febrile diseases is at first the result of a poison locally applied; that this action begins in certain organs, often primarily and chiefly in the stomach, not so much on account of the local reception of the poison there, as because that viscus possesses an extraordinary portion of susceptibility of excitement; that this action, so implanted in the stomach, the centre of association and sympathy, is gradually extended to other viscera with which it has principal sympathetic relations, such as the heart, brain, lungs, &c. that this action must necessarily, in most cases, commence with a nascent feeble existence, and only by degrees acquire growth, strength and stability; that when once the force of habit is joined to the original violence with which this action began, the means of subduing it will become every hour more precarious and difficult; and, finally, that this action of organs so tender and vital, if allowed to proceed, will often, in a few days, render the system unfit to sustain life, and produce those appearances of disorganization which dissection exhibits after death;—it follows, from a due consideration of these circumstances, that the first object of the physician should be to arrest this diseased action in the earliest hours of its formation, before a more extended operation, time and habit, shall have fixed its possession of the system, and that he should regard all subsequent attempts as comparatively feeble and uncertain.

Although it is not my design to deliver any general account of the treatment of febrile diseases, it will not be improper to glance at some of the remedies whose application depends upon the principles which I have attempted to explain. In this view of the subject, the most direct methods of arresting febrile action are, 1st. To excite a new action subversive of the existing one in the organ originally and principally affected, and in such as are associated with it; and, 2dly. To divert morbid action from an important or vital part, by exciting a sufficient degree of it in some other part less essential to life.

As an example of the first class, it is proper to mention the efficacy of emetics at the commencement of febrile diseases, the use of which is sanctioned by immemorial experience. The evacuation they procure, though often confessedly important, constitutes but a small proportion of the advantage which is found to result. Sydenham perceived this effect with his usual sagacity, without thoroughly understanding the cause. "When I have happened," says he, "sometimes carefully to examine the matter thrown up by vomit, and found it neither considerable in bulk, nor of any remarkable bad quality, I have been surprized how it should happen that the patient has been so much relieved thereby; for as soon as the operation was over, the severe symptoms, viz. the nausea, anxiety, restlessness, deep sighing, blackness of the tongue, &c. usually abated and went off, so as to leave the remainder of the disease tolerable."* His annotator, Wallis, properly remarks on this passage, that Sydenham "was not aware of the sympathetic affections which take place in the constitution, nor knew that an extremely small portion of morbid matter could produce effects so sudden and surprizing, from local action, so as to derange the whole system." It will be apparent to every body, that this morbid action in the stomach, whether primarily or sympathetically excited, while yet only beginning, must be comparatively unsettled and undetermined in its operation; and that this offers the golden opportunity, perhaps never to return, of creating a different and more healthy action by means of emetics, and thereby of rescuing the patient from the danger which awaits him. And at the same time it will be equally apparent, that if emetics be exhibited after certain degrees of morbid excitement shall have been actually formed and confirmed in the stomach, that they will not only be entirely incompetent to dislodge the disease, but will aid and hasten that disorganizing process which renders the system incapable of life.

* Works, vol. i. p. 34 of Wallis's edition.

Sudorifics may be properly taken as an example of the remedies which operate by diverting morbid action from an important and vital to a less important part. It has been often supposed that they produce their beneficial effects by causing the discharge of certain noxious fluids, which, being retained in the system, would have caused a continuance of the febrile commotion. This opinion is opposed by a number of difficulties, which it seems impossible to remove or surmount. On the contrary, the referring of the efficacy of sudorifics to a revulsion of excitement from internal organs to the skin, is conformable to known laws of the animal economy, and supported by facts which fall under daily observation.

The plan of curing diseases by transfer or revulsion of excitement from one part of the system, and fixing it in another, includes a great proportion of our most powerful remedies, and opens a wide field of future discovery and improvement. The effects of mercury in producing ptyalism—of blisters in inflaming and vesicating the skin, and exciting a strangury—of sinapisms, other rubefacients, and of many other articles operating on similar principles, afford examples of this revulsion of excitement. Though it is not requisite that these remedies should be always employed, like emetics, in the forming stage of the disease, it is certainly expedient to bring many of them early into use. This is particularly the case with mercury. According to the principles of association, febrile action will be more easily subdued in its earlier than more advanced stages: hence the mercurial disease will be efficacious in destroying the original one in proportion to the expedition with which it is excited. It is probable, likewise, that the mercurial action will be more readily introduced in the beginning of the disease, when morbid sympathies are few, and feebly catenated, than at a later period, when all the important viscera are labouring under excess of stimulus, and when time and habit have confirmed the strength of the noxious association. Some degree of this reasoning will, doubtless, be applicable to all the articles which belong to this head. In the case now under consideration, the causes of diseases, and the remedies for them, operate on the system upon the same principle. It is by an excessive concentration of excitement in certain organs, and by robbing others of their due share, that such noxious powers induce disease. By pursuing an analogous course, and soliciting excitement back again from the diseased parts, in order to fix it in others less essential to life, the physician (differing chiefly from the morbid

cause in the parts to which he applies the stimulating agent) imitates the procedure of those noxious principles which are most inimical to life.

The doctrine of the leading agency of the stomach in the establishment and extension of the morbid motions called febrile, satisfactorily explains the effects of emotions of the mind, and especially of terror, in bringing on diseases, and imparting to them a malignant character. Whatever weakens the stomach will expose it to the attack of febrile poison. No part of the body exhibits more intimate connection with the mind than that organ. No other part has its functions so immediately affected by mental emotions, as is often observed in the sudden loss of appetite and suspension of digestion by the arrival of joyful or afflicting intelligence. The consequences of this close connection often become pernicious in the seasons of mortal epidemics. Every individual, at such times, must be presumed to be more or less under the influence of the reigning noxious power. Terror is apt to start up and assail the mind from trifling as well as substantial causes of apprehension. The stomach being, as has been seen, the chief recipient and propagator of morbid action, and this morbid action being most likely to intrude and fix itself when that viscus, from any cause, is deprived of its accustomed tone; it clearly results that terror may operate in seasons of malignant epidemics as a powerful and destructive exciting cause. Experience and observation confirm the opinion suggested by reasoning. It is often popularly remarked, that such as are most fearful of malignant diseases are most apt to be attacked by them. There can be no doubt that this opinion is founded in fact. Many of the vague and mistaken accounts of the propagation of malignant diseases by contagion, admit of an easy explanation on this ground. A system, impregnated with the prevailing virus, but capable of sustaining it, without injury, so long as the equilibrium of excitement can be exactly preserved in the several parts of the body, may be supposed to be suddenly struck with terror at the sight of some frightful spectacle, or at the recital of some alarming story. What will be the consequence? The well-adjusted balance of excitement is immediately lost; the stomach, deprived of its tone by mental agitation, is left a prey to the insidious destroyer which had been long lying in wait for such an opportunity of intruding. This principle will go far to explain many pretended facts concerning the contagiousness of Asiatic plague and the yellow fever. It is asserted that contact

is the surest mode of communicating the contagion of the plague. It may be said, with equal truth, that contact is the surest mode of exciting terror in the person exposed to that kind of intercourse. If the apprehension of contagion floating in the atmosphere, and casually applied to the bodies of men, be a source of alarm, what must be the consternation of such as believe themselves to receive immediately from the persons of the sick the undiluted infection they so much dread? It is well known that persons who have imbibed the poison of pestilential epidemics often escape injury, until exposure to cold or fatigue, the effects of intemperance, indigestion, &c. coming in aid of that poison, suddenly induce the disease. There is good reason to rank terror among the most potent of such occasional causes. Among an ignorant and superstitious people, the danger of actual contact will naturally be much more highly rated than that of any species of poisonous particles diffused in the air. This impression will be strengthened by the recollection of several diseases communicable by contact, but not by effluvia. And it is probable that a mortal epidemic, by filling the minds of the weak with frightful impressions, especially when these impressions are heightened by an accidental contact of the sick, is rendered much more destructive to the community through the associative operation of fear, which thus, under the mask of contagion, exerts a fatal influence on the system, through the medium of the stomach. All the resignation that fatalism can boast, in Mahometan countries, is insufficient to shield the mind, and the groupe of vital organs connected with it by sympathy, from the ravages of terror and despair.

The noxiousness of terror seems to admit of illustration from the effects of intemperance in debilitating the stomach, and thereby inviting the attack of febrile action. The observation is familiar to every person, that the invasion of malignant diseases is more frequent and violent after a fit of drunkenness. That the stomach is, in this case, the first and principal sufferer, will not be denied. But the condition of this organ is not rendered much more unfit for the performance of its functions by a debauch than by the overwhelming operation of terror.

The use of mild corroborant remedies, during the prevalence of malignant epidemics, for the purpose of securing the system against the approach of febrile action, by supporting the powers of the stomach, is strongly enjoined by the view which is here presented of the functions and irritability of that

organ. The efficacy of such remedies is also established on the ground of experience. The daily use of a small quantity of Peruvian bark to fortify the stomach, and, through the medium of that, the whole system, against the fevers of tropical regions, has preserved multitudes from the attack which otherwise awaited them. It is believed that no instance of the failure of it, if properly taken and continued, stands upon record.

The sympathetic theory of fever affords the easiest solution of the problem of its spontaneous cure. The healthy action and associations of the several organs of the body are more natural, powerful and durable, than such as are morbid, and, of consequence, have an incessant tendency to recur, and regain their force whenever the excitement of the disease proves too feeble to disorganize or extinguish the life of the affected parts.

The same theory satisfactorily explains the cure of diseases by such a variety of different, and often opposite remedies. If evacuants be employed, the sympathetic relations of all the important organs to one another will frequently, in milder cases, render it almost a matter of indifference whether this or the other mode of evacuation shall have been preferred. And it is equally plain, that to excite a new action in any part, subversive of the existing morbid one, or to produce a revulsion of excitement from an organ of importance to another less essential to life, an hundred different remedies may be used without leading to any material variation in the result. Still, however, it should be always remembered, that there is a highest grade in the appropriateness of the selection, as well as in the efficacy of remedies, which the enlightened physician will incessantly endeavour to approach.

An attention to the condition of the stomach has been always known to physicians as a leading part of their duty in the treatment of malignant diseases. The reason and necessity of this will more fully appear if it be granted, as has been attempted to be shown, that this organ, from its peculiar and unequalled susceptibility, is the chief introducer and propagator of febrile action, the most apt to become the subject of its disorganizing violence, and, as a medium of the operation of remedies, its most powerful counter-agent and destroyer. And hence it will be obvious that the proper management of this noble organ, and of its band of noble associates in sympathy, is of primary, essential, and decisive importance, in the prevention and treatment of malignant fevers.

 REVIEW.

ART. I. *The great Error of American Agriculture exposed; and Hints for Improvement suggested.* By Thomas Moore. Foolscep 8vo. pp. 72. Baltimore. Bonsal & Niles. 1801.

IF our information is correct, the author of this agricultural essay is the President of the Farmer's Society, established at Sandy-Spring, in Montgomery County, in the State of Maryland. In that neighbourhood the inhabitants have gratified their desire of communicating ideas upon this complicated and experimental art, by embodying for the purpose. And were it allowable to form an opinion of the Society from this performance of the President, we should entertain sentiments very favourable to it and its members.

The cultivation of the earth may be considered as the most useful of the arts. It furnishes those productions which are immediately necessary to the sustenance of man. And the people who steadily devote themselves to the occupations of agriculture are justly deemed more independent, more virtuous, and more happy, than any other denomination of men. In America, particularly, agriculture is the foundation of productive industry, and the bulwark of moral habits. Throughout the United States, the land is distributed among a great number of proprietors: these proprietors have the entire ownership and disposal of their freeholds: the ecclesiastical incumbrances of tythes, and the feudal impositions of rents and services, are unknown: and the improvements of the farmer or planter accrue to themselves and their families, inheritable as a clear estate, or transferable at their option to any purchaser. Where the soil is parcelled out among millions of free citizens, each has more at stake in the community, has greater importance and higher responsibility, and as he values his actual enjoyment and future prospects of happiness, will become convinced that the self-government he exercises ought to be founded on wisdom and virtue. From these causes may be deduced that independent spirit, that honest demeanour, that unsuspicious frankness, and that unaffected patriotism, which distinguish the sons of agriculture.

How worthy, then, of consideration is this noble art!

How laudable the efforts of those who detect its errors or introduce improvements!—How particularly commendable are those Americans who labour and make experiments for the instruction of their fellow citizens! Next to the invention of the plough, that most useful of all instruments, the *proper use of it in tillage* presents itself to the mind. Mr. Moore, the writer of the essay before us, is of opinion that the mismanagement or ill-direction of the plough is the capital misfortune of American husbandry. For want of sufficient magnitude and strength of construction, it is not capable of penetrating the earth to a sufficient depth; and the furrows, being so superficially formed by the share, give little opportunity for the roots of plants to penetrate them and be nourished. He considers that the American farmers have too implicitly followed the method of European writers, without making the requisite departure from their directions on account of the difference of latitude, soil and exposure. And he professes an enlightened and rational zeal for making original experiments in our own land, whereby the interests of practical farming may be most substantially promoted among us.

To enable our readers the better to comprehend Mr. M.'s design, and the manner in which he has executed it, we have thought proper to quote his own words (p. 10), where, after some remarks on the climate and soil of the United States, he thus proceeds:

“These things being premised, I shall endeavour to enumerate some of the evils inseparably attached to that great error in American agriculture, *shallow ploughing*; beginning with new lands, or those just cleared of wood.

“What is the language of our farmers and planters on these occasions? ‘Our soil is not more than two or three inches deep; we must plough *shallow*, otherwise we shall turn up too great a portion of *dead earth*, and ruin our crops.’ They also say, ‘We must plant *wide*, otherwise a drought will cause our corn to fire.’* And for these supposed weighty reasons, those two practices are almost universally adopted on new lands; to wit, shallow ploughing and wide planting.

“Here our men of experience prove they are acquainted with the effect, without knowing, or even inquiring into the cause. Their mistaken opinion respecting dead earth will be noticed in due place; but it remains here to be proved that the necessity of wide planting is one of the consequences at-

* “The lower leaves turn yellow.”

tached to *shallow ploughing*. All plants imbibe moisture from the earth by their roots: if this portion of their sustenance is withheld, though every other species of vegetable nutriment abounds in the soil, the plant becomes sickly, growth ceases, and, finally, death ensues. In search of the necessary supply, the roots of plants are extended in all directions, where the soil is open enough to admit them, and to a distance proportionate to the demand. Two plants of the same kind require a greater quantity to preserve health than one: hence it will appear, that a drought of sufficient duration to extract most of the moisture contained in that part of the soil loosened by the plough, may yet leave sufficient to preserve one plant in health; but if divided, both must suffer, for neither can penetrate the hard unstirred earth below for a supply. But in case of long droughts, no distance whatever will insure Indian corn from suffering when the under stratum is hard and the ploughing shallow, and under these circumstances. Few summers are so wet, but that close planted corn, at some period of its growth, discovers the want of a full supply of moisture, which, perhaps, might be amply afforded by one or two inches greater depth of ploughing. They have discovered, that after the first year several succeeding crops will admit of being *closer* planted: the fact is, that the surface having now been for some time cleared of leaves, rubbish, &c. and exposed to the action of frost, sun and dews, that portion of earth, lying originally immediately below the black mould, and called dead earth, which was turned up by the cultivation of the preceding year (for in common soils it is almost impossible to plough so shallow as to avoid turning up some in new grounds), has now acquired a dark colour, and therefore not known to be the same; and, some of the obstacles to ploughing being removed, they almost insensibly go an inch or two deeper, without showing any greater appearance of the yellow or dead earth, so much dreaded, than the preceding year. This furnishes a more extensive pasture* for the roots of the plants growing therein, and also becomes a more copious reservoir for treasuring up moisture for the needful time; and, consequently, affords a supply for a greater number of plants. The second year is generally found to be much more productive than the first, after which our common lands gradually decline.

* "For want of a more appropriate term, the word pasture is used to express the body of loose earth into which plants freely project their roots in quest of food."

"The undecayed fibrous roots prevent much loss of soil by washing the first year: on lands not perfectly level it generally begins the second, and continues annually. The ploughing being about four inches deep, does not afford a sufficient quantity of loose earth to imbibe the whole of the heavy showers that frequently fall during summer; the consequence of which is, as before observed, that when the open soil becomes *saturated*, water must accumulate on the surface, and, flowing off in torrents, bears away a portion of the finest and most valuable part of the soil: succeeding ploughings bring to the surface a fresh supply of mould, which, in turn, follows the last. Thus ploughing and washing alternately following each other, the original soil is soon deposited in sunken places, beds of creeks, rivers, &c.

"This waste is in some measure compensated, and fertility continued, by the fresh earth brought up from below; for the plough continuing to pass about the same depth, must, of course, descend into the unstirred earth in proportion as the open soil is carried from the surface; but of this the cultivator appears ignorant; the proportion brought up at each ploughing being small, and soon acquiring a dark colour by being exposed. I am fully convinced, that in many places the surface is now at least the whole depth of the ploughing lower than at first clearing: of this we need no other proof than the half buried posts in low places, the heads of rivers, creeks and mill-ponds filled up, which are every where to be seen in our hilly cultivated lands.

"But notwithstanding the before mentioned supply of vegetable earth from below, the soil employed in cultivation must annually become less fertile; because the coarse, the heavy and adhesive particles of earth, remain on the spot from the beginning, and those of the same properties, contained in the fresh earth brought from below, also remaining, while the finer and more friendly parts are continually carried away; at length the proportion of fine soil becomes too inconsiderable to answer the purpose of vegetation to any degree of profit: Thus the land becomes sterile, not so much from the vegetable nutriment being extracted from the soil by the growth of plants, as by the soil itself being removed. That this is a necessary consequence of *shallow ploughing*, on lands that are in any degree hilly, in this climate, I trust, has been proved.

"Another material evil that results from the practice of *shallow ploughing*, and which applies to all surfaces, level as well as hilly, is the injury the growing crops sustain for want

of a more regular quantity of moisture in the soil. We know, by experience, that either extreme is fatal to most of our crops. That the practice is calculated to produce both, at different periods, is evident: for, during a long continuance of *wet*, for the reasons before mentioned, the water must *stagnate* in abundance about the *roots* of the *plants*: and, on the contrary, a short continuance of *drought* extracts nearly the whole of the *moisture* contained in the thin covering of *loose earth*; and it is not to be supposed that the tender roots of plants, in quest of a supply, can penetrate the *compact earth below*, which has been hardening ever since its formation.

“Hitherto I have principally alluded to summer crops; but if we observe the effects of *shallow ploughing* on winter crops, we shall find the injury to them still greater. All that has been said will apply to them in their autumnal growth; but it is in the spring, and early part of summer, that it often proves particularly injurious, and sometimes fatal to them. Those who have been accustomed to stopping leaks about mills, &c. know, that earth thrown into water, made to incorporate with it, and then subside, settles into a more solid mass, and becomes more impervious to water, than in any other way it can be applied: no ramming is equal to it. The same thing frequently takes place, in a degree, on the surface of our fields. The great rains that often fall about the vernal equinox, drench, and almost render *fluid*, our *shallow worked* soils; the solution of the finer parts entering the pores as the water evaporates, the whole settles into a *compact mass*, and so remains till harvest; for, notwithstanding it may be frequently moistened, yet no other disposition of parts can be supposed to take place until operated on by frost or the plough.

“This state of the soil is too compact to admit of the free extension of the roots even when moist; but, when hardened by droughts, every particle of nutriment not in contact with some of the roots is effectually *locked up* from the *suffering plants*. So that it often, nay, almost always happens, on lands worked in this way, unless very rich indeed, that crops of wheat that look promising in the fall, and early in the spring, begin to decline towards harvest; and people are complaining of the unfavourable appearance of their wheat. When harvest arrives the straw is almost too short to cut, and the heads about half the proper length, and those not well filled, yielding six or seven bushels to the acre, where twelve or fifteen might have been reasonably expected, from the quality of the soil. These appearances and products agree with my

constant observation for many years past, especially on early sowed corn ground; damages by fly, rust, &c. excepted.

"If *manures* are applied to *shallow worked* soils, their good effects, in general, will be of short duration, as most kinds must soon inevitably travel the road the virgin soil has before them."

Having thus stated the bad effects of *shallow* ploughing, Mr. M. assigns various reasons in favour of *deep* ploughing, and then recites the following experiments:

"A field was sowed with wheat by a tenant, the ploughing from three to four inches; a deep hollow extended across part of the field, in a direction nearly east and west; the side exposed to the north tolerably good; the south exposure very rich. As might be expected, the wheat on the strongest soil made the most promising appearance in the fall, and also for some time in the spring; in the early part of which clover-seed was sown on the whole, which came up well; a drought came on late in the spring; the south exposure *drying first*, the wheat soon showed the effects of it; and the drought continuing, a considerable part entirely *perished*; the north exposure also suffered, but being more shielded from the action of the hot sun, was not so effectually dried. At harvest it was much the best wheat, notwithstanding the superior richness of the soil on the other side." A still greater difference appeared in the young clover: on the south hill side it was almost entirely killed, on the other very little injured.

"I have had some experience of the beneficial effects to be derived from *deep ploughing*; but the obstructions in most of my fields (particularly large stones just below the surface) have prevented my adopting the practice so fully as I could wish; yet the success that has always attended my experiments, in conjunction with my observations on the practice of others, has been conclusive evidence to my mind.

"In the year 1795 I took possession of my present farm, and had a field ploughed for wheat, which had been thought, for several years before, too poor to cultivate, either in wheat or Indian corn. I saw rye growing on the best part of it, two years before, just before harvest, that I think would not yield two bushels to the acre. It was ploughed early in the spring, about eight inches deep, and repeated, with harrowings, at proper intervals, several times during summer. It was sown about the last of the ninth month. The soil being weak, the growth in the fall was slow, as also in the spring, yet regular; the colour always good, and no appearance of suffer-

ing, either from *drought* or *wet*. At harvest the straw was not tall, nor thick on the ground, but the heads large and well filled; the product between sixteen and seventeen bushels per acre, except a part of the field, sown with a kind of wheat I was not before acquainted with, which was too thin, in consequence of a short allowance of seed. I observed the state of the soil, from time to time, until *harvest*, and found that, even *then*, it was open and in good tilth, except a crust of two or three inches next the surface.

"In the spring of 1796, with a large plough and four horses, I broke up part of a field. I measured the ploughing frequently, and found it, in many places, eleven inches deep, and no where less than seven; so that the average was at least nine. This piece contained about four acres, on a gentle declivity; the surface too much exhausted to pay for cultivating any crop in the common way. This ploughing brought to the surface about five inches of earth that had never before been exposed, which was principally clay; at the upper edge of the piece of a bright yellow, which became gradually paler further down, and of a bluish appearance near the lower side. After several stirrings, it was sown with buckwheat the same year; the crop tolerable. After the buckwheat came off, the ground was ploughed and sown in rye, in the eleventh month; very little of which came up, owing, as I suppose, either to its being too late put in the ground, or the seed not good. It remained without further tillage until last year, (1800), when it was again sown in buckwheat, which grew so large as generally to fall. Before it was ploughed in the spring, I took several of my friends to see the difference in the appearance of this piece and the ground adjoining, that had lain the same length of time out of tillage: it was discernible to a furrow. The *deep ploughed* piece appeared of a fine open texture, and *dark* colour, thick set with white clover: the adjoining ground, compact and hard, of a *pale* ash colour, bearing scarcely a blade of any other kind of grass than that common to old fields, known by the name of poverty-grass. In short, one had the appearance of an exhausted old field, and the other of land lately manured. Those who expressed a sentiment on the subject, were of opinion, that to those who did not know what occasioned the difference, the *deep ploughed* piece would sell for double the price of the other.

"Part of another field, from having a very retentive clay near the surface, was of that kind called cold or sour land,

and was thought unfit to produce any crop; either water or ice generally appearing on the surface, in an open time in winter. This was so thick set with white flint-gravel and stones, that the first ploughing could not be deep; but having cultivated several crops on it, taken off the largest of the stones, and, consequently, been able to get a little deeper at each succeeding ploughing, the nature of the ground seems altered, so that now there is seldom either water or ice to be seen on its surface, more than is common to other places. It is now in red clover, very little of which has been injured by the late open winter. This piece has been manured; it is therefore unfair to ascribe the quantity of the crops, which have been good, to deep ploughing only; though I am of opinion, that on such land manures are not of much consequence without it."

Mr. M. very properly ascribes the prevalence of shallow ploughing to habit and prejudice, which exert their baneful effects upon several other operations in agriculture. Of these he mentions particularly the destructive custom of clearing wood-land and destroying timber at the most wasteful and wanton rate in some of the lower counties of Maryland and a great part of Virginia; the pernicious application of labour in hoeing and collecting hillocks of earth around the clusters of Indian corn in the Southern States; and the feeding their live-stock from the corn-house, at great expense, while the more economical and fertilizing practice of sowing grass-seeds, and thereby increasing pasture, is miserably neglected.

The remainder of this performance is chiefly devoted to practical directions on the collection and application of cow-yard and hog-pen manures, and on the succession and rotation of crops. Various useful remarks occur on the culture of potatoes, pease, beans, buckwheat, clover, barley, wheat, oats, Indian corn and tobacco; as well as instructions concerning farming-stock and pasture, and the means of increasing the latter by the aid of gypsum, which, he thinks, acts by rendering the soil stimulant.

Our inclinations would lead us to give a more detailed account of this part of the work, did we not flatter ourselves that many of our readers may be encouraged to peruse it entire. We can freely recommend to them a publication from which we have derived both pleasure and instruction; and assure them that it has no appearance of coming from a speculator or a theorist, but from an experienced, judicious, and PRACTICAL FARMER.

ART. II. *A Brief History of the Mississippi Territory; to which is prefixed a Summary View of the Country between the Settlements on Cumberland River and the Territory.* By James Hall, A. M. 8vo. pp. 70. Salisbury (N. C.) Coupee. 1801.

IT having been judged proper, by the General Assembly of the Presbyterian Church and the Synod of the Carolinas, to send Missionaries to the Mississippi Territory, the reverend author of the performance before us was one of the ministers appointed for that service. From Nashville he and his associates proceeded on horse-back, by way of the Chickasaw nation, to the place of his destination, where he arrived in December, 1800. He left the Mississippi Territory near the end of April, 1801.

During the time of his journeying and residence, Mr. Hall improved the intervals of his gospel-labours in collecting information concerning the natural history, discovery, settlement, climate and productions of this part of the United States. The historical materials he obtained from the French History of Louisiana, and the Attorney-General's Report to Congress. The rest were derived from his own observation, and the conversation of discreet and credible persons.

The arrangement of the work is not very regular, nor does there appear to have been much pains taken with the style. It seems to have been written in haste, as the author's avocations from professional employment would permit. And although we think he has given his pamphlet a title by far too important, in denominating it a "History," yet there is a variety of information contained in it which we believe may interest our readers.

Mr. H. begins by relating what he particularly observed in passing from Cumberland River to the Mississippi Territory; asserting, what has since been confirmed by Mr. Hawkins, that spinning, weaving and agriculture, are making considerable progress in the Chickasaw villages. The boundaries of this territory, as purchased from the natives, he describes in the following words:—"Beginning on the eastern bank of the Mississippi, where it is intersected by the thirty-first degree of north latitude; thence along that parallel sixty miles, which divides it from West-Florida on the south; thence a direct course between north and west, until it strikes Yazoo River, ten miles above its confluence with the Mississippi; thence down

those rivers to the [place of] beginning; including Adams County on the south, and Pickering County on the north. It is situated between the 31st and 34th degrees of north latitude.—Connected with those is Washington County, on Tombigbee, which is separated from the above by a waste of Indian land of more than two hundred miles in breadth. Those three counties were purchased from the natives by the British, when in possession of the Floridas."

He describes this territory as extending more than one hundred and fifty miles along the Mississippi, and as generally well watered, abounding not only in many permanent springs, but with several considerable streams, which, in the progress of improvement, may be made capable of conveying boats and produce many miles into the country. Along the Mississippi lies a body of land from fifteen to twenty miles wide, and in the vicinity of the streams still wider, scarcely any part of which ought to be reckoned barren. Among the trees growing there on the hills and low grounds, are mentioned cypress, cotton-wood, sycamore, holly, wild peach-tree [what is this?], magnolia, red-oak, walnut, cherry, mulberry, elm, ash, iron-wood, and vines. He measured a red-oak, whose circumference, at the distance of a yard from the ground, was twenty-six feet, making a diameter of more than eight feet, and giving us an idea of an enormous tree. Free-stone, and a yellow calcareous earth, which is apparently a concretion of shells, are found there. This, when burned, affords good lime. The land is destitute of stones.

On the soil and produce of this region Mr. H. writes thus: (p. 29.)

"The soil is exceedingly fertile for Indian corn, tobacco, indigo, cotton, hemp and flax. It is also tolerably favourable for wheat, rye, oats and barley; but the grain of these is not so full and heavy as in more northern climes. The tobacco in that country is said to be the best in the union. Cotton is now the staple commodity in the territory, and grows to great perfection. To the maturing of that, as well as other produce, the warmth and length of the season must contribute. The quantity of cotton in the seed, produced from one acre of land, is from 1000 to 2000 (some say 2500) pounds. About 1500 may be considered the average. Hence, from 130 acres of good land, a farmer will expect about 200,000 pounds, for which quantity many farmers were pitching their crops last spring. This will produce 50,000 pounds of clean cotton.

"Almost every farmer of considerable force has a horse-gin on his farm. These will take out of the seed from 700 to 1000 pounds of clean cotton in a day. To those gins the lower class of farmers carry their cotton, which is taken out for the tenth pound. A few gins are turned by water; but dams are so difficult to be kept up, that few risk the expense.

"Garden vegetables grow there in the greatest perfection. I ate ripe strawberries on the last week of March, which were cultivated in a garden, and green pease on the first week of April.

"It is expected the sugar-cane may be cultivated in the lower part of the territory to advantage. A planter made an experiment last summer, fifteen miles above the boundary, which promised success in the cultivation of that article."

The only trade of this country is by means of the Mississippi, either upwards from New-Orleans, or downwards from Pittsburgh, Kentucky and Tennessee. This river is stated to be not more than 180 perches wide at Natchez, and not to become perceptibly broader until it has passed the 31st degree of latitude.

Among the curiosities of the Mississippi Territory, particular mention is made of chasms and sinkings of the earth in various places—of the rapid encroachments of the river upon its eastern bank, wasting it away very fast—and of large portions of undermined ground tumbling into the water. This goes on so violently, that the very place on which the town of Natchez stood, as lately as the year 1780, is now under water at some distance in the river, as the inhabitants who then lived there, and are still alive, assert. Corresponding to this, the low land on the west side of the river, subject to be flooded by the rise of its waters, is above thirty miles wide, and seems to be a dereliction of the river as its channel has gradually shifted by encroachment to the eastward. Remains of ancient mounds of earth, and remains of fortifications, like those found so frequently in other western parts of the United States, occur not unfrequently here. He mentions eight or ten on the lands of one proprietor; and he describes, with some detail, in page 51, a very large work of this kind near Ellicottsville, whose area is near *seven acres*. Mr. H. thinks they were thrown up by the aborigines. (p. 50.)

We extract the following description on account of its very singular nature:

"Another curiosity," says the author in p. 56, "which occurred to my view, was the *pigeon-roost* on a branch of

Big Black, about 60 miles below the Chickasaw nation. The reader may call it natural or artificial as he pleases. An account of the phenomenon there exhibited carries with it such an air of the marvellous, that, had I been the only spectator, it would have been passed over in silence. The pigeons had taken their station in and about a place known by the name of the Hurricane Swamp. The greater part of the large timber had been blown down, and they had perched on the branches of the small timber that remained; and which being broken by them, now hung down like the inverted brush of a broom. Under each tree and sapling lay an astonishing quantity of their dung, of which, from the specimens we saw, there must have been not only hundreds, but thousands of waggon loads. Round each resting-place was an hillock raised a considerable height above the surface, although the substance had been there eighteen months when we made our observations on the place. At that time the heaps were, no doubt, greatly sunk. What bounds they occupied we could not ascertain, as the swamp was so full of brambles and fallen timber that we could not leave the road. It is near a mile diameter; and, as far as I can recollect, their traces were the chief part of the way, and about an hundred paces on the north side of the swamp."

To give an idea of the number and weight of the pigeons, Mr. H. then relates that a hickory tree, of more than a foot in diameter, was alighted on by so many of these birds, that its top was bent down to the ground, and its roots started a little on the opposite side, so as to raise a bank. Trees of a brittle structure were often broken off by them. We leave our readers to ponder these things without any comment of ours. Mr. H. affirms that a bed of clam and oyster shells, as fair as ever lay on the shore of the Atlantic, is to be seen in an old field in the Chickasaw country. (p. 58.)

The following humorous anecdote is related of an Indian Sachem of the Natchez:

"In an early period of the settlement on the Mississippi, a trader made a voyage up the river with a quantity of arms and ammunition, which he exchanged with the natives to advantage. Another adventurer made the same voyage the next year, expecting they had exhausted their ammunition. In this he was disappointed; for they had still a considerable quantity. They were solicitous to know how powder was produced. He gave them to understand that it was sown, and produced by way of crop, and recommended their sa-

wannas as the most suitable soil for that purpose. They accordingly sowed what they had, and purchased his cargo to serve them until the new crop should come to maturity. They set guards round the place to defend it from wild beasts, and watched it with anxiety, but no crop appeared.

"The next year another trader went to the same place with a quantity of goods, was received courteously by the chief, and a house was provided in which he stored his cargo. On the next day the Indians convened, and began to open his bales. One pulled this way, and another that way, until his goods were all gone. He went to the chief and remonstrated. The chief told him gravely, *that as soon as they had gathered the crop of powder he should be paid*: and so he was dismissed."—But we must recommend those who would know more of this writer's narrative and observations to the work itself.

ART. III. *Six Introductory Lectures to Courses of Lectures upon the Institutes and Practice of Medicine, delivered in the University of Pennsylvania. By Benjamin Rush, M. D. Professor of Medicine in the said University. 8vo. pp. 168. Philadelphia. Conrad & Co. 1801.*

THE subjects of this volume are various, composed of introductory addresses to the author's pupils, delivered in successive years to different classes. They all bear the stamp of that animated and interesting manner of communicating instruction for which he has been celebrated ever since he entered upon the duties of a Professor of Medicine. From the ample fund of learning and experience which is annually laid open to those who hear him, he has been induced, in consequence of promises made to many of the members of the classes, to select the following lectures for the press. We hope the same solicitation and compliance which favoured the public with the present collection, will, on some future occasion, be exercised for the purpose of producing a much larger work of a similar kind.

Lecture 1st treats of "*the necessary connection between observation and reasoning in medicine.*" In the discussion of this subject the author exhibits the several pretensions and defects of empiricism and dogmatism, when either separately arrogates to itself the right of conducting medical practice,

and shows that it is only by a combination of both that the science of medicine can be made to convey extensive and lasting blessings to mankind. The syllabus which follows, of his course of lectures upon physiology, pathology, therapeutics, and the practice of medicine, gives an outline of what is most necessary to be taught and understood in those important branches of science, and affords evidence of the Professor's comprehending in his plan of instruction many subjects which have escaped the attention of other teachers.

Lecture 2d exhibits an interesting view of "*the character of Dr. Sydenham.*" A great number of circumstances combine to render that physician an object of veneration, and to hold up his conduct and character as an example to all succeeding times. His improvements undoubtedly form an æra in the history of medicine. In this portrait of him which Dr. Rush draws, the originality, boldness and vigour of his understanding are forcibly represented; his independence of authorities and preconceived opinions; the comprehensiveness of his views, and the solidity of his judgment; his attention to the effects of peculiar seasons and climates; his admirable mode of exhibiting the history and symptoms of diseases; his discovery of the laws of nature relative to the rise, progress, comparative force, and succession of epidemics; the simplicity and efficacy of his remedies; and the correctness of many of his theoretical opinions. In addition to this display of professional excellence, Dr. R. draws, with equal force and felicity, the social, moral and religious character of Dr. Sydenham, in all which respects he is deservedly held to be a model for imitation.

Lecture 3d unfolds a catalogue of the "*causes of death in diseases that are not incurable.*" It is melancholy to reflect, that amidst all the imperfection and feebleness of the medical art, the success of it should be still further curtailed by the ignorance, negligence, prejudices, follies and vices of the sick themselves, or of those who undertake the management of them. Such causes of death are distributed under three heads: 1. Those which are derived from physicians; 2. Those which arise from the conduct of sick people; 3. Those which arise from the conduct of attendants and visitors.

Lecture 4th displays "*the influence of physical causes in promoting an increase of the strength and activity of the intellectual faculties of man.*" On this subject the author treats of the effects produced on the mind by aliment, drinks, opium, tobacco, different positions of the body, dress, weakness,

disease, pain, sleep, certain sounds, temperature of the air, rural and mountainous situations, residence in cities, silence and solitude, darkness and blindness, particular studies and amusements, variety of studies, the exercise of composition, the passions, the will, conversation, politics, religion, association, &c.

Lecture 5th offers a very instructive and interesting view of "*the vices and virtues of physicians.*" The facts and examples which the author adduces on this subject are judiciously selected, and cannot fail to attract the attention of every reader. On the one hand, those professional vices which too often disgrace practitioners of medicine, and hold them up to public detestation, are faithfully sketched; while, on the other hand, for the encouragement and example of all who are awake to impressions of excellence, the author has exhibited some of the most brilliant instances of virtue that can adorn the human character.

Lecture 6th exhibits "*the causes which have retarded the progress of medicine, and the means of promoting its certainty and greater usefulness.*" A very comprehensive enumeration of those causes is delivered in this lecture. What the author says on the subject of nosology is so much entitled to consideration that we shall present it in his own words:

"The last cause I shall mention, which has retarded the progress of medicine, is the division of diseases into genera and species, by means of what has lately received the name of nosology. Upon this part of our subject I shall be more particular than was necessary under any of the former heads of our lecture, for no one of the causes which has been assigned of the imperfection of our science, has operated with more effect than the nosological arrangement of diseases. To expose its unfriendly influence upon medicine, it will be proper first to repeat, in part, what I have published in the fourth volume of my *Inquiries and Observations*, before I proceed to mention the manner of its operation.

"1st. Nosology presupposes the characters of diseases to be as fixed as the characters of animals and plants: but this is far from being the case. Animals and plants are exactly the same in all their properties that they were nearly six thousand years ago; but who can say the same thing of any one disease? They are all changed by time, and still more by climate, and a great variety of accidental circumstances. But the same morbid state of the system often assumes, in the course of a few days, all the symptoms of a dozen different genera of dis-

eases. Thus a malignant fever frequently invades every part of the body, and is at once, or in succession, an epitome of the whole class of Pyrexia in Dr. Cullen's Synopsis.

"2d. The nosological arrangement of diseases has been attempted from their causes and seats. The remote causes of diseases all unite in producing but one effect—that is irritation and morbid excitement—and, of course, are incapable of division. The proximate cause of diseases is an unit; for whether it appears in the form of convulsion, spasm, a prostration of action, heat, or itching, it is alike the effect of simple diseased excitement. The impracticability of dividing diseases into genera and species, from their seats, will appear when we consider the feeble state of sensibility in some of the internal organs, and the want of connection between impression and sensation in others, by which means there is often a total absence of the sign of pain, or a deceitful and capricious translation of it to another part of the body, in many diseases. In the most acute stage of inflammation in the stomach, there is frequently no pain, vomiting, nor sickness. The liver, in the East-Indies, undergoes a general supuration, and sometimes a partial destruction, without pain, or any of the common signs of local inflammation. Dr. Chisholm, in his essay upon the malignant West-India fever, mentions its fatal issue in two sailors whom he dissected, in one of whom he discovered great marks of inflammation in the lungs, and in the other a mortification of the right kidney; but in neither of them, he adds, was perceived the least sign of disease in those viscera during their sickness.* Baglivi found a stone in the kidney of a man who had complained of a pain only in the kidney of the opposite side during his life. I have lost two patients with abscesses in the lungs, who complained only of a pain in the head. Neither of them had a cough, and one of them had never felt any pain in his breast or sides. Many hundred facts of a similar nature are to be met with in the records of medicine. Even in those cases where impression does not produce sensations in remote parts of the body, it is often so diffused, by means of what has been happily called, by Dr. Johnson, 'an intercommunion of sensation,' that the precise seat of a disease is seldom known. The affections of the bowels and brain furnish many proofs of the truth of this observation.

"Errors in theory seldom fail of producing errors in prac-

* "Vol. i. p. 184."

rice. Nosology has retarded the progress of medicine in the following ways.

"1st. It precludes all the advantages which are to be derived from attacking diseases in their forming state, at which time they are devoid of their nosological characters, and are most easily and certainly prevented or cured.

"2d. It has led physicians to prescribe exclusively for the names of diseases, without a due regard to the condition of the system. This practice has done the most extensive mischief where a malignant or inflammatory constitution of the atmosphere has produced a single or predominating epidemic, which calls for the same class of remedies under all the modifications which are produced by a difference in its seat and exciting causes.

"3d. It multiplies unnecessarily the articles of the *materia medica*, by employing nearly as many medicines as there are forms of disease.

"I know it has been said, that by rejecting nosology we establish indolence in medicine; but the reverse of this assertion is true: for if our prescriptions are to be regulated chiefly by the force of morbid excitement, and if this force be varied in acute diseases by an hundred different circumstances, even by a cloud, according to Dr. Lining, lessening, for a few minutes, the light and heat of the sun, it follows, that the utmost watchfulness and skill will be necessary to accommodate our remedies to the changing state of the system."

From the brief account of this publication which our limits impose, we are persuaded our readers will be induced to peruse the whole with attention.

ART. IV. *Medical and Physical Memoirs, &c.* By Charles Caldwell, M. D. &c.

[Continued from p. 204, and concluded.]

MEMOIR III. *On the Winter Retreat of Swallows.*

THREE different opinions are stated by the author to be held by naturalists relative to the winter retreat of swallows, viz. 1st. That they migrate from high latitudes, and pass the winter in warm climates. 2d. That, instead of migration, they retire to rocks, caverns, hollow trees, and other places of security, where they spend the winter in a state of

torpidity. 3d. That they retreat, at the close of summer, to the bottoms of rivers, lakes, and arms of the sea, where they remain torpid in the mud till the return of the next spring.

The object of this memoir is to establish the opinion of the migration, and to oppose that of the submersion of swallows.

In the first place Dr. Caldwell takes a brief view of the evidence in favour of the submersion of swallows. He examines the testimony of Dr. Wallerius, a Swedish chemist—of Mr. Peter Cole, of New-York (see *Med. Repos.* vol. iii. p. 178, first edit.)—and of Professor Kalm. In all their accounts of the submersion of these birds, he believes that there is reason to suspect the correctness of their observations; and he assigns a variety of objections to their statements, as well as of suppositions concerning the manner in which their mistakes may have arisen.

In the second place Dr. C. offers a considerable number of facts and arguments, which, while they militate, in his judgment, against the opinion of the submersion of swallows, favour that of their migration to distant climates. One of the most remarkable of these facts is an experiment which the author tried upon two swallows which he immersed in the water about that season of the year in which these birds annually disappear. They were both drowned, and apparently dead, in the short space of time requisite, in common cases, to produce that effect. After being allowed to remain under water some hours, every exertion was made to restore them to life, but all in vain.

We cannot agree with Dr. C. that such an experiment as this, nor that his physiological arguments drawn from the structure and functions of swallows, can have any decisive effect on the determination of this question. If the submersion of swallows be really true, it must be performed at certain times and places, in modes and under circumstances which we cannot arrange nor imitate. It must be acknowledged, indeed, that his facts and reasonings ought to prevent us from lightly giving ear to the accounts of submersion, and to induce us strictly to scrutinize the authenticity and the details of every narrative on the subject. There is, however, an assignable weight of testimony (much greater, perhaps, than has been hitherto obtained), which would be sufficient, with reasonable minds, to compel belief, and would render the explanation of the principle altogether subordinate to the admission of the fact.

MEMOIR IV. *Strictures on a "Memoir concerning the Disease of Goitre, as it prevails in different Parts of North-America, by Benjamin Smith Barton, M.D. &c. &c."*

In this concluding part of the work under consideration, Dr. C. opposes the opinion, or rather the conjecture of Dr. Barton, that the principle remote cause of goitre may be a miasm of the same species as that which produces intermittent and remittent fevers, dysenteries, and other similar complaints.

The plan which the author pursues in these strictures is, 1st. "To inquire into the nature and force of the evidence on which the above belief is founded;" and, 2d. "To state a few arguments which seem to militate against the opinion that goitre and bilious fever result from the same cause."

Under the first head Dr. C. combats the arguments deduced by Dr. Barton from the frequent appearance of glandular affections in countries in which intermittent fevers prevail; from the general prevalence of such fevers in those situations where goitre is found; from the complexion of goitrous persons; and from information received, that, in the State of New-York, those persons who are affected with goitre are commonly exempt from intermittents, though in the midst of persons labouring under these latter complaints. In order to oppose these reasonings Dr. C. denies the fact that glandular affections, excepting those of the liver, spleen and mesentery, are more frequent in countries subject to the prevalence of intermittent fevers than in others; and, as to the remaining facts, he endeavours to explain and draw inferences from them of a very different kind from those of Dr. Barton.

Under the second head Dr. C. proceeds to state some arguments which he supposes to militate against the opinion that goitre possesses a common origin with bilious fevers. These are as follow: that goitre never appears in many of the most extensive of those tracts of low country in which intermittent and remittent fevers annually prevail; that goitre, though not exclusively a disease of the female sex, attacks women much more generally than men; that this disease does not appear to be more troublesome from the middle of summer till the close of autumn than at other seasons of the year; that this disease does not, like bilious fevers, make its first appearance in summer and autumn; that it does not, like diseases or forms of disease which spring from a common cause, alternate or exchange forms; that fevers arising from the miasmata of putrefaction do not, like goitre, produce a tendency to fatuity;

that the latter disease is not, like bilious fevers, subject to periodical revolutions of prevalence and violence; and, lastly, that the miasmata of marshes are never known (except, perhaps, in the hepatitis of the east) to produce a topical and chronic affection, unless as the result of preceding general fever.

We have thus given a brief outline of the reasonings adduced by Dr. C. to invalidate this opinion of Dr. Barton. It must be granted that some of them form weighty objections to the admission of the doctrine of the origin of goitre and intermittent fevers from a common cause. But it must be observed, at the same time, that the learned author of the Memoir concerning Goitre foresaw many of these objections in their full force; that he presented his view of this subject chiefly in the form of conjecture, with all the wariness, caution and candour which become philosophical investigation; and that, with all its acknowledged uncertainty, it seems to be the most plausible opinion concerning the cause of goitre which has ever yet been offered to the public.

ART. V. *A Reply to Dr. Haygarth's "Letter to Dr. Percival on Infectious Fevers," and his "Address to the College of Physicians at Philadelphia, on the Prevention of the American Pestilence;" exposing the Medical, Philosophical, and Literary Errors of that Author, and vindicating the Right which the Faculty of the United States have to think and decide for themselves respecting the Diseases of their own Country, uninfluenced by the Notions of the Physicians of Europe.* By Charles Caldwell, M.D. Fellow of the College of Physicians of Philadelphia, &c. &c. &c. 8vo. pp. 50. Philadelphia. T. & W. Bradford. 1802.

OUR readers will recollect the notice we took of this extraordinary performance of Dr. Haygarth in the department of Review in our last number. Dr. Caldwell, being one of the American gentlemen whom that British physician had undertaken to censure in acrimonious and illiberal terms, vindicates himself, in the pamphlet before us, from accusations which had been so uncivilly laid before the public.

Irritated by the singular mode of attack which Dr. Haygarth had thought proper to commence, Dr. C. gives a specimen of a spirited, warm and indignant reply. When the "Letter to Dr. Percival" first came into our hands, we did

not doubt but our injured countryman would feel irresistibly impelled to measure weapons with his European adversary. Finding himself driven to the necessity of repelling invasion, and guarding against a repetition of similar inroads, he carries the war into the enemy's territory, and lays waste some of his finest provinces with fire and sword. We could have wished that more moderation and justice on the part of Dr. Haygarth had prevented such extremities, or that some mode had been devised to avoid the resorting to the *ultima ratio*. But as self-defence and resentment of a manifest aggression were considered as indispensable, let them serve, at least in this instance, as a memento of the value of peace, of the imprudence of obtruding censures on unoffending foreigners, and of the hazard of crossing the Atlantic to provoke hostilities.

Dr. C. thus repels the indelicate and domineering intrusion of Dr. Haygarth into the medical discussions of America :

“The presumption and folly betrayed by homebred foreigners, in pretending to instruct us in the knowledge of our endemic and epidemic complaints, are strikingly manifested by the following consideration:—European physicians, on their first emigration to the United States, never fail to show themselves ignorant of the nature, and incompetent to the treatment of our common diseases, even when cases of them are submitted to their observation and care. They find themselves under a necessity of serving a second apprenticeship, in order to assimilate their ideas and habits to their new situation, and to render them skilful American practitioners. The most enlightened and liberal of them, that have settled in this country, have made repeated acknowledgment of this truth. How, then, can their brethren and former associates, immured at home, become possessed of, and communicate to others, that knowledge which they acquire only by travel and experience?

“As well might an American physician, who had never visited foreign climates, undertake to teach the nature and cure of the *Lepra Græcorum*, the *Mal d'Alleppo*, or the *Cochin leg*, as a British physician, accustomed only to the complaints of his own country, attempt to impart instruction respecting the diseases of the United States. As well might the Parliament of Great-Britain, in their present ignorance of our circumstances as a nation, attempt to legislate for all our emergencies, as her Faculty to decide for us with regard to the nature, prevention, or cure of our epidemics. By the help of books alone, a physician may, even in his closet, acquire a knowledge of the general principles of diseases; but it is only

by travel, observation and experience, that he can learn to apply these principles to the diversified circumstances of different climates and countries.

“ But what shall we say to the magisterial pretensions of Dr. Haygarth in this respect? Whence do they originate, and on what are they founded? Where is the fund of experience to sanction them, or the sources of observation to render them even plausible? Has the Doctor a single qualification, either natural or acquired, which designates him as a man prepared to shed light on the subject of our late epidemics! Has he ever expatriated himself for the purpose of enriching the science of medicine by an examination of nature in foreign countries? Has he ever left the temperate atmosphere of Great-Britain, to gain a knowledge of the diseases of regions that lie nearer to the sun? Such a journey might have both expanded his capacity and augmented his information: for the sun of the tropics has oftentimes ripened into active intellect the hebetude imported from higher latitudes. Has he ever crossed the Atlantic to study the climates, the topography, and the diseases of the United States? Or does his mind possess such an exalted station in the region of intellect, as to enable it to overlook the globe, and to descry and comprehend, at a glance, the scenes that are passing in distant hemispheres? Those who know this gentleman best, will be the last to answer these questions in the affirmative.

“ But his conduct may be influenced by different considerations. Perhaps he may found the boldness of his pretensions as an author on the maturity of his years. Many writers less youthful are more modest; and it is to be lamented that grey hairs give no infallible earnest of either wisdom or liberality. Does he derive his self-sufficiency from an education finished in the schools and hospitals of London and Edinburgh? The public teachers of these places, being themselves inexperienced in true pestilential diseases, are unable to impart a knowledge of them to their pupils. Is the extent of his reading the cause of his imaginary superiority over his brethren in the United States? We will not positively assert that he is not a man of profound erudition; but we have no evidence whatever to convince us that he is. But, be the case as it may, books are at best but a secondary source of information, and a mere acquaintance with them should never be set in competition with observation and experience. But perhaps he may pride himself on being a native of the same country which produced a Harvey, a Sydenham, a Cullen, and a Hunter. We entreat

him to remember that weeds may infest the ground which has been overshadowed by the lordly Addansonia, and that the same clime gives birth to the lion and the jackal.

"Were Dr. Haygarth much younger than he is, we might ascribe his presumption to the inexperience and temerity of youth; and, if much older, we might commiserate him as being under the influence of dotage. But, flourishing as he is in the meridian of intellectual manhood, we are sorry to say, that we can trace his unbecoming pretensions and manner to no other source but the extent of his self-conceit.

"What less can we say of a man who, insulated in his observations to the diseases of a few country towns in Great-Britain, and removed a thousand leagues from the scene of action he is examining, presumes to vilify the reasonings of the Academy of Medicine of Philadelphia, a society deliberating on the spot, and consisting of members individually as respectable as himself? What less, I repeat, can we say of such a man, when he has the assurance to annex to the reasonings of such a society, the rude epithets, 'frivolous, inadequate, and groundless?' For the sake of whatever reputation he may now possess, we hope he will, in future, have more prudence than to expose himself by attempting to teach what he does not understand, and more delicacy than to insult others for exercising what they conceive to be a well-founded right to differ from his crude and visionary notions."

After these observations, Dr. C. proceeds to a more particular examination of Dr. Haygarth's performance. In doing this he offers remarks on the character of the author as a scholar, as a philosopher, and as a man of candour and veracity. Under each of those heads he presents strictures and criticisms which cannot fail to derogate from the literary and scientific pretensions of his opponent.

ART. VI. *Explanation of the Synopsis of Chemical Nomenclature and Arrangement: containing several important Alterations of the Plan originally reported by the French Academicians.* By Samuel L. Mitchill, M.D. F.R.S.E. Professor of Chemistry in Columbia College, &c. &c. 8vo. pp. 44. with a Chart. New-York. T. & J. Swords. 1801.

THE author of this pamphlet and chart, according to the theory of Boscovich, considers all matter as consisting of atoms infinitely small, balanced between attractive and repelling

334 *Mitchill's Explanation of Chemical Nomenclature.*

powers. These atoms are the materials which constitute the greatest as well as the least of the aggregate and compound bodies in creation, as units compose the highest as well as the lowest of integral numbers that can be conceived. Of these atoms we know nothing but from their effects and properties. Their essence is beyond our researches, and their infinite smallness renders it impossible to examine them either by touch or by sight. From their attractions and repulsions, which are all we know about them, we have been able to class them according to their similitudes; and, judging from these, there do not at present appear to be more than between sixty or seventy sorts of uncompounded atoms in the whole fabric of our globe and its atmosphere.

That kind of attraction which takes place between similar or homogeneous atoms is called the attraction of *cohesion* or of *aggregation*, because it compacts atoms of the same kind into aggregates or masses. Another form of attraction is exerted between atoms of *dissimilar* constitution, and is therefore called *chemical* attraction. The atoms of matter are so constituted as to attract each other, and to combine in an endless variety. Observation, however, has taught, that there are certain combinations more frequent than others; as, for instance, those of metals with phlogiston, and of acidifiable bases with caloric. For the purpose of exhibiting these and some other common forms of bodies to more advantage, they are distributed under nine heads, as follow:

"1. The abstract names of such atoms as are simple and uncompounded, or, in the present state of our knowledge, are considered so. These appellatives are nouns, expressive not of the respective families of atoms in any condition observable by us, but of that pure and abstract state in which the understanding may conceive it possible for them to exist.

"2. The names of primary atoms when combined with phlogiston; which phlogiston, as herein understood, means that kind of atoms which form the basis of inflammable air or hydrogenous gas, and no other kind.

"3. The terms employed to express the state of dry fusion, or the condition of bodies melted without the aid or intervention of water. This is the condition of bodies whose atoms are considerably separated by anticrouon, the repelling principle, or what has been denominated caloric, though not sufficiently to evaporate them.

"4. The names given to atoms so far repelled by anticrouon or caloric as to form gases or permanently elastic

fluids. This is a state which rarely, if at all, exists, but which is necessary to be expressed in order the better to explain their states when combined with water.

" 5. The names and terms under the fifth title are intended to express the state of *dry oxyd* and acid. In this form bodies seldom or never exist (except metallic calces), on account of their very strong attraction for moisture. But this condition of *dry oxyds* and acids was necessary to be expressed for the sake of giving a better idea of their modifications by water.

" 6. Names and terms expressive of that condition of atoms when, after much repulsion by anticrouon or caloric, and attraction by oxygen, the compound is rendered liquid by water. This applies to acids in their ordinary and fluid state, and to all solutions of bodies in water.

" 7. This title denotes the condition of certain atoms, which exist in the form of gas, combined with a portion of water, and sometimes with oxygen. In this are included all the acids and alkalies when rarified to the vaporific state, as well as all gases or aëriform fluids.

" 8 Atoms, after combination with oxygen into oxyds and acids, combined with other bodies; as happens to acids in their junction with earths, alkalies and metals, to form the very numerous order of neutral salts.

" 9. This title includes acidifiable substances, and some others in connection with substances not acidifiable, and not forming neutral salts. Among other things, metallic ores and alloys of metals belong to this division."

The additional divisions here made to those of the chart of the French Academicians will be immediately perceived by the reader.

As the author introduces the term *anticrouon* to signify what the French academicians call caloric, we present his reasons for this proposal in the following quotation:

" *Anticrouon*, το αντικρουον, is the neuter termination of the active participle of the present tense, from the verb αντικρουει, to repel or keep at a distance. It is intended to express the principle or agent which produces repulsion among the atoms of matter: and as repulsion always exists among the constituent elements of bodies, the repelling principle would always seem to be there. In many cases we can ascertain its presence by our sensations, by instruments and machines; and we know that, according to the force or intensity of it, may a solid body undergo mere expansion, or be dilated to a liquid or

melted state, or be repelled so powerfully as to become volatile or to rise in vapour. A word which expressed all these effects, or rather the influence by which such effects were produced, has a happy operation upon the mind, by suggesting to it invariably the principal modifications of matter in which it is instrumental. It was stated in the preliminary remarks, that the atoms of which bodies consisted did not come into *perfect contact* under any circumstances in which we were acquainted with them, because there was repulsive agency among them powerful enough to prevent it. This repulsion has, by some philosophers, been supposed to inhere in the atoms themselves, and to be a part of their nature; while others ascribed it to a foreign agent introduced among them. However the fact may be, this we know for certain, that when, from the solar rays, from culinary heat, or the fire of a furnace, the repelling principle, or anticrouon, is introduced among the particles of any body, it increases the common repulsion existing there, and, if carried far enough, will evaporate and dissipate them. Since, therefore, repulsion, as far as we are acquainted with it, in bodies considerably heated, is occasioned by anticrouon, it is fairly presumable, that, in other cases, where its effects are less obvious to us, as in their ordinary and low temperatures, a more moderate action of the same principle imparts to their component atoms their common or ordinary rate of repulsion. We know of no state wherein there is an absolute or total privation of caloric or anticrouon, and, of course, we know not of any condition of bodies wholly exempt from its repulsive power. Anticrouon, then, the repeller, the repelling principle, or the principle of repulsion, seems, upon strict examination, universally to produce separation or dilatation among the atoms of bodies after its introduction into them. And this idea is more simple than the supposition of one repelling power inherent in the atoms themselves, and another as an inseparable property of caloric.

“Among the effects of anticrouon upon sentient beings, as man, is a sensation called heat; and this name has been very generally used also to signify, besides the sensation, the agent causing the sensation. There would, for this reason, be great impropriety in retaining, for philosophical purposes, the word ‘heat,’ which denotes both the stimulus which excites the sensation and the sensation excited. But there is a more serious objection than this: neither the term heat, nor any of its derivatives, express chemical or physical qualities. They

signify only *one* of the various modes by which anticrouon, or the principle of repulsion, operates; to wit, the sensation it excites when moderately acting on the human organ of touch; but there are numberless gradations of repulsion among the atoms of natural bodies, which produce no acute sensation at all upon it. And when the human skin is acted upon by some of the lower degrees of it, the effect wrought is not called *heat*, but *cold*. Hence it appears, that the sensation of *heat*, which gives a term that tinctures all this part of philosophy, is very limited even in a sentient being; and two words, with opposite meanings, are introduced into all discussions, and are unavoidably, by these means of association, brought to mind. To show how improper the word *heat*, or *caloric*, or *calorific*, is, we need but to recollect that the principle so named existed before man existed to feel it; and may continue to operate upon more durable things, when the race of man shall be no more. The word '*fire*' is also improper, as it signifies merely another mode by which anticrouon acts, that is, in the decomposition of inflammable substances, with an extrication of sensible heat and light. The most obvious and extensive effect of this sort of atoms being repulsive, their generic name ought to be derived from this property, and to express it. Wherever the word was pronounced, we should think of this predominating operation of it upon all matter, without the needless incumbrance of words, and their ideas and associations, derived from human feeling. Thus *dilatation* might be the common name to express the effect of anticrouon on hard and fixed substances, as the metals; *expansion*, to signify an enlargement of volume in the same or similar bodies, when melted; *evaporation*, the conversion of fixed substances to airs or vapours; *heat*, when affecting the nerves of a sentient being in a particular manner; *fire*, when acting on a combustible substance, &c. By modelling the language in this manner, anticrouon, or the repelling principle, would always be presented to the mind; and the heating effect on man and other creatures, instead of being incessantly obtruded on the memory, would be occasionally brought up when that particular effect of anticrouon was under consideration. But as those effects of repulsion called *heat* and *fire* are most familiar to man, they have been most commonly introduced into discourse and writing, not only about *sentient* bodies and *combustible* substances, but have been applied to those which possess neither feeling nor inflammability. The phenomena of anticrouon have therefore been confusedly stated,

and some incongruities have clouded the subject. If the earth is to be reserved for destruction by fire, the elements to be melted with a fervent heat, and the works that are therein to be burned up, all that is necessary to be conceived for the accomplishment of such a dissolution of the fabric of nature, is a mere abolition of the power of attraction among the atoms, or an increase of repellency, whereby the existing coherence may be overcome. This destruction of the compages of matter is the counterpart of that process, which, during the time of its organization, drew its atoms together. And the same providence which, by a predominance of attractive power, organized the world, can, by simply augmenting the repulsive power (*anticrouon* or fire), instantly disorganize it. And this sentiment, so understood, is as agreeable to correct philosophy as to sound theology.

"Thus it appears that *anticrouon*, or the repelling power, is incessantly present in all the substances with which we are acquainted. Being the universal cause of repulsion in the atoms of which bodies consist, there is an impossibility of conceiving their present constitution without taking it into consideration: and, therefore, as indispensibly necessary to the existence of all the modifications of matter, *anticrouon* the repeller, instead of caloric the heater, is placed at the head of the list."

In this improved chart the author has likewise substituted *phlogiston* for hydrogen, and *septon* for azote, on grounds which have been amply exhibited in former parts of this work.



MEDICAL & PHILOSOPHICAL NEWS.

MEASLES.

THIS disease made its appearance in the city of New-York about the middle of last November. For several weeks it crept slowly from one family to another; so that, at the end of December, it had made but little progress from the neighbourhood where it was first observed. Early in the month of January it began to spread over the city, and throughout that month and February, till the present time (24th Feb.), it has continued to prevail, and has been remarked to attack such as had not previously undergone the disease much more universally than on former occasions of its epidemic appearance.

The regular character of the measles has been generally preserved in this instance of its epidemic prevalence. In most cases the disease has been mild; a large proportion of the few fatal cases having arisen among those who, from ignorance, inattention or poverty, did not treat the disorder with the requisite care. How far the extreme mildness of the winter may have modified the character of this epidemic, we cannot undertake to decide.

There is no doubt, from a number of cases observed in the course of this season, as well as heretofore, that spurious forms of measles, insufficient to protect the system from subsequent attack of the true disease, occur in a manner very analogous to the spurious appearances of small-pox and of the vaccine disease. Many persons who, on former occasions of the measles prevailing, and after exposure to the contagion, had exhibited certain irregular appearances of febrile, catarrhal, and eruptive symptoms, mistaken for the true disease, have been attacked this season with measles in an exquisitely genuine form.

A NEW BOTANICAL WORK.

A natural history of St. Domingo is now compiling by Dr. Edward Stevens. The materials of this work were chiefly collected by this gentleman during his residence in Cape-Francois, and the other settlements of that colony, as Consul-General of the United States. It will contain descriptions of

more than sixteen hundred of the indigenous plants; and be embellished with engravings of many of the more remarkable species, done by the best artists in America. This highly desirable performance will be published in large folio, and will be the most considerable publication of the kind ever made on this side the Atlantic. It will likewise comprehend the medical and economical qualities and applications of the vegetables treated of.

GOLD AND PLATINA FOUND AMONG THE MOUNTAINS OF ST. DOMINGO. *Extracted from a Manuscript of Mr. Giroud, lent to Dr. Mitchill by Dr. Stevens.*

In the year 1796, certain interior regions of St. Domingo were surveyed with a mineralogical eye by Mr. Giroud. He was appointed by the French government to travel and explore that colony, and made a report of his observations and discoveries to Mr. Roume, the agent of the republic for the time being in that island.

In one of his letters, dated at Cape-François, 6th July, 1796, he informs that at *Dondon* he had found platina mixed with the ferruginous sand which is so frequent in the ravines of that country. In the neighbourhood of *St. Raphael* he found another ferruginous sand mingled with particles of gold and platina. He sent specimens of these to the National Institute in France. In the districts of *Angusturo*, *las Sanjas*, *Savana Iglesia*, *Janico*, *Gausave Hagua*, *Juana Huma*, and *la Cinènèga*, Mr. Giroud says nature has distributed gold with a liberal hand. It is of various forms (*paillets*, *graines* et *grosses pepittes*), and disseminated through a sandy grit, among rounded pebbles, and among an argillaceous and reddish earth abounding in iron. The mountains in these parts he considers as of the *ternary* or *tertian* order, and evidently formed from the ruins and crumbling of the higher and larger mountains of the *primitive* and *secondary* kinds. He is a *Neptunian* in theory, and believes they assumed their present form and structure at the time when the ocean still occupied the valley which extends from the *Bay of Samana* on the east end of the island quite across to *Daxabon* and *Monte-Christo*, between the two chains of the *Puerta Plata* and *Monte-Christo* on the north, and of *Cibao* on the south. In this extended valley calcareous substances and relics of the ocean are often found, and in these *tertian* mountains they are jumbled together with the granitical and primeval materials of the an-

cient mountains. This auriferous valley is cut, furrowed, and in many places divided by streams of water, the principal of which are, *Rio-Verde*, *Hagua*, *Jaque*, *Yuna Humia*, *Janico*, *Cibao*, *Mao*, *Magna*, *Guaravin*, and *Hamina*. Gold is found hereabout over a surface of sixty square leagues, though much more abundantly in some places than in others. Every where the rivers, torrents, brooks and rills, wash down gold in the before mentioned forms, particularly after rains.

July 29th, 1797, Mr. Giroud viewed the two great chains of primitive mountains in St. Domingo. They are GRANITIC. The one ridge to the south-east of St. Jago rises above the clouds, and is called Mount *Cibao*, or, as the inhabitants contract it, *Bao*. The other, which is also hidden by clouds, is called *Lomas Peludes* of the great *Sierriana*. From these many large rivers take their rise. Accompanied by two mountaineers, named Nicolas Fernandez and Pedro Rodriguez, he travelled to their summits; and he computes the elevation of the highest peak, that of *Antonsepo*, to be 1400 toises (8400 French feet) above the level of the ocean.

In the neighbourhood of *Cibao*, and at the foot of *Lomas Peludes*, there is an abundance of the granitoidal rock called Gneiss, the *Saxum Metaliferum* of the Saxons, and of the best informed miners. Among this are found great quantities of iron and copper pyrites. He believes some of it contains gold. These primitive mountains and their waters are, however, less abundant in gold than the countries and streams below.

He mentions the river *Cibao*, so called from the mountains of Cibao, as abounding in gold, and to the westward of them others as rich. In *Guaraguana* and *Acao* he says there is gold. He procured it himself by washing the sand, and found it frequently mixed with platina. The common washers of these golden sands hereabout always find grains of platina mingled with those of gold; and a ferruginous sand, attractable by the magnet, always accompanies them. They are particularly industrious, to pick out and throw away the larger particles or grains of platina, because the goldsmiths of St. Jago will not buy their gold if it contains more than a certain quantity of platina. They know platina only by the names of *emerete* or *puntal*, and consider it as the pest of the virgin gold which is brought them to work, as they know no other method of separating the two metals than that of picking them out by hand.

Mr. Giroud concludes, that besides the vast quantities of

vegetable produce which this fertile island can afford, it contains the sources of immense riches in its *mineral* department. He thinks the latter can be attended to without the least interference with the former. The gathering of gold will not in the least prevent the cultivation of sugar and coffee; though he justly considers agriculture as preferable to mining.

THE WHITE-BACK OR CANVASS-BACK DUCK.

This species of duck is more extolled for the delicious flavour of its flesh than any other of the whole order of waterfowl. It is supposed by some to be the *sheldrake* of the European ornithologists, which is a bird very different from the saw-billed bird of that name in New-York.

There is a fine specimen of the canvass-back in Mr. Peale's Museum. It is a migratory fowl, and breeds in the regions north or north-west of the territory of the United States. The old ones return southward with their young, so as to arrive on the coast of the Atlantic towards the end of autumn or the beginning of winter. There they remain until the approach of warm weather, and then fly away to their more northerly summer residence.

Although these ducks migrate in this manner, there are very few places in which they are found. It is not known that they frequent the waters north of Chesapeake-Bay; though it has been affirmed that a straggler has now and then been killed. Indeed, their range to the southward is so circumscribed, that they are rarely or never seen at present any where but on the waters of the Susquehannah and the Potomack; and in vain do the sportsmen seek them in the rivers of the Southern States. Sometimes they are seen on the tables of the luxurious in the city of New-York; but in these cases they have always been sent from the Chesapeake. Formerly they were frequent in James-River, in Virginia; but latterly they have deserted it altogether. This abandonment of a place formerly resorted to by them is supposed to be owing to a failure of the particular food which formerly invited them there.

This food is of the vegetable kind; for it would scarcely be expected that a bird of such a delicate taste at the table should subsist on animal aliment. They feed upon the roots of a coarse long grass which grows in the two before-mentioned rivers, higher toward their sources than the *salt water* extends. And these roots, which are large, succulent, and resemble,

in some respects, those of *celeri*, are procured by diving: for the canvass-back is a *diver*.

Within the remembrance of people now alive, canvass-backs were so numerous on those parts of the Potowmack where their food abounded as to cover acres of its surface, and to be seen in flocks for a mile or more in extent. They might then be bought from three-pence to six-pence a piece. At present (1802) they are become so scarce that few are killed, and a single one costs seventy-five cents or a dollar. Whenever ice covers the *fresh water* of the Susquehannah and the Potowmack, and forces the canvass-backs to leave their feeding-places, and go down to the salt water of the Chesapeake and live as other ducks do, they very soon become lean, and their flesh loses all the excellence of relish for which it is so highly prized.

The increase of navigation on the rivers disturbs them considerably: but, in addition to that, they are so incessantly alarmed and destroyed by the gunners, that their numbers are diminishing very rapidly. It is therefore expected, that in a few years they will desert these places of resort altogether, and seek an asylum in some region less frequented by their devourer, man.

CURIOUS FACTS CONCERNING THE MODE OF GENERATION
IN THE AMERICAN BEAR.

The singular departure from the common course of nature in the procreation of the opossum and the shark, are already known; but the manner in which the *foetus* is matured by the female bear is not so generally understood. The following information was given to Mr. Franklin, Senator of the United States from North-Carolina, by the hunters. This animal hibernates, and, during the winter, retires to hollow trees and caverns, but does not become torpid, or sink into the sleeping state. Though found often in great numbers on the frontier settlements, and frequently killed and eaten by the inhabitants, there has never been an instance of a female killed in a pregnant condition, or big with young. The reason is, that almost immediately after conception, the *foetus*, while shapeless, and resembling merely a small animated lump, is excluded from the womb. Thus born, and exposed to the open air, it has no connection with the teat like the opossum, nor with an egg like the shark. There is no trace of a placenta nor umbilical vessels. The growth of this rudiment of a future bear is supposed to be promoted by licking; and the sa-

liva of the dam, or some other fluid from her mouth, appears to afford it nourishment. In the course of time, and under such management, the limbs and organs are evolved, the surface covered with hair, and the young cub at length rendered capable of attending its parent. Thus far the inquiries of the hunters have gone. The facts are so curious, that the subject is highly worthy of further investigation. And when the entire history of the process of generation in this animal shall be known, new light will be shed upon one of the most obscure parts of physiology. It is to be hoped that gentlemen whose opportunities are favourable to the prosecution of this inquiry, will furnish the learned world shortly with the whole of these mysterious phenomena.

THE EGG OF THE GOAD-FLY DEPOSITED IN THE BACKS OF
NEAT CATTLE.

The large black fly which torments cattle and horses excessively during the hot season, not only sucks blood from the backs of these creatures, but makes a puncture through the skin, and lays its eggs there: at least this is a frequent occurrence among neat cattle, though not known to occur among horses. The egg so deposited there grows to the size of a large worm nestling in the cellular membrane. This gradually works its way through the skin, and rolls off to the ground, where, in process of time, it hatches to the common black goad-fly. A gentleman of observation and respectability, and a practical farmer, has verified this by an experiment. Observing his herds of cattle to be infested with these animals, which in that state are called *warbles*, he was desirous of knowing what perfect insects (imago) would proceed from them. For this purpose he enclosed some of them in cases, so that there could be no communication with external objects; and he found *the warbles were converted to goad-flies*.

IMPROVEMENT IN QUARANTINES.

On Tuesday, January 11, 1802, Dr. Mitchill moved a resolution in Congress, that a committee should be appointed to report what alterations were necessary in the law respecting quarantines. The resolution was agreed to, and a committee appointed. The committee consists of Messrs. Mitchill, Eustis, Leib, Archer and Lowndes. The particular object aimed at is to cleanse ships and vessels by means of *alkaline salts and leys*, and to explode the miserable and delusive practice of fumigation—in short, to apply the modes of *cleaning*

houses to the purification of ships. This will reduce the quarantine of vessels to the simple process of cleaning by alkalies; and eventually remove from commerce most of the tedious and burthensome restraints under which it is now groaning. Science will have a glorious triumph; and the American government will set a noble and liberal example to the whole civilized world.

YELLOW FEVER PRODUCED IN THE WEST-INDIES BY THE GASES EXHALING FROM HERRINGS OF NORTH-CAROLINA PUTREFYING THERE.

The following instructive facts are taken from a letter of Mr. Samuel Russel, of New-York, to Dr. Mitchill, dated January 12, 1802. About the 10th of June last a merchant purchased two hundred barrels of North-Carolina herrings. They were of the sort called *dry-salted*. They were stored in the city of New-York until the first of July, and at that time were discovered to be considerably offensive. However, they were put on board a vessel for exportation, and chiefly stowed on deck. In this condition they were carried to the island of St. Croix. But the market being bad, it was determined to run down to Kingston, in Jamaica, where the vessel arrived near the end of August. The captain sold his herrings to an auctioneer, and delivered them into his store. By this time the fish were discovered to be fast spoiling, and advancing rapidly through the putrefactive process. The master of the store and his clerk lived and slept in a room directly above that in which the fish were now laying and corrupting. They both were invaded by *yellow fever*, and after suffering a very violent attack of the disease, recovered their health with great difficulty. The opinion prevalent in Kingston was, not that a supposed contagion was imported there, but that a *poison, engendered within the barrels of corrupting fish*, had escaped into the store and room, and had been the exciting cause of the disorder; operating there in the West-Indies as it does here in the United States.

Dr. JOHN MACE, of Dorchester County, Maryland, in a Letter to Dr. MILLER, gives the following Account of a Malignant Disease in that County in the Summer and Autumn of 1800.

"In the year 1800, a malignant, bilious or yellow fever prevailed in the lower part of Dorchester County, State of Maryland. This part of the county consists entirely of low land,

with a large tract of swamps and marshes. The water in these places usually continues plentifully all the summer; but this summer it was nearly all dried up. The pestilential fever began about the 10th of August, and continued its ravages until the next November, assuming different forms according to different circumstances. It was attended with great heat, preceded by chills; violent pains in the head, back, hips, and sometimes the knees and breast; nausea and vomiting, with a burning pain in the stomach, black discharges from the intestines, a muddy colour of the whites of the eyes, hæmorrhages from the bowels, and a yellow colour of the skin. Bleeding, with active cathartics, the application of blisters, and a salivation, were the only successful remedies; while the Peruvian bark, and other similar medicines, evidently increased all the symptoms of the disease. The yellow fever also occurred in the same place, attended with the usual symptoms of malignity, in the course of the last summer and autumn. I have been induced to give the above account, because it will tend, in some degree, to support the doctrine of the domestic origin of American pestilence. There were some cases of yellow fever in Dorchester County in 1800, which were brought from Baltimore; but many genuine cases of the disease occurred in persons who had not been near Baltimore, nor any one infected with the complaint from that city. Moreover, it is well known that there have been no cases of malignant fever in Baltimore, in the course of the last year, and yet there have occurred many instances of it in Dorchester County. The doctrine of importation is therefore totally insufficient to explain the origin of the yellow fever in these cases. A more circumstantial account of the epidemics of Dorchester County, in 1800 and 1801, will hereafter be laid before the public."

NEW-YORK VACCINE INSTITUTION.

A number of the citizens of New-York, impressed with the importance of substituting the inoculation of the vaccine disease for that of the small-pox, lately agreed to associate, and to contribute to the establishment of a public institution for that object. The design of this institution is three-fold; to extend the advantage of vaccine inoculation to the poor—to maintain a permanent supply of genuine matter for the use of the community—and to disseminate a knowledge of this inoculation among the physicians of the adjacent country. After public meetings, held by the contributors for the purpose, they formed and adopted a constitution suited to their design;

and then proceeded, in pursuance of the constitution, to elect the officers of the institution, when the following gentlemen were elected:

Directors.

James Watson,	Samuel Bowne,
John Keese,	Robert Bowne,
Samuel L. Mitchell,	Isaac Hicks,
Gilbert Aspinwall,	William Moore,
Thomas Buckley,	Samuel Miller,
Willet Seaman,	Andrew Cock.
James Robertson,	

Thomas Franklin, *Treasurer.*

Adrian Hegeman, *Secretary.*

The Directors made choice of the following gentlemen to perform the various duties assigned to their offices by the constitution:

James Watson, *President.*

Gilbert Aspinwall, *Vice-President.*

Medical Board.

Valentine Seaman,	Edward Miller,
Wright Post,	Samuel Borrowe.
Samuel Scofield,	<i>Resident Surgeon.</i>

The Directors having procured a suitable apartment, and made other necessary arrangements, the Medical Board have commenced inoculation, and are now proceeding in it with every prospect of carrying into effect the benevolent intentions of the founders of the institution.

At the last meeting of the contributors, the following resolution, moved by Mr. Samuel Bowne, was unanimously adopted, viz.

“Resolved, that in testimony of the high estimation in which this meeting of contributors hold the philanthropic and able exertions of EDWARD JENNER, M.D. F.R.S. &c. of London, and BENJAMIN WATERHOUSE, M.D. professor of the practice of physic in the University of Cambridge, in Massachusetts, relative to the inoculation of the Kine-Pock, they are hereby appointed perpetual honorary Directors of this institution.”

On the Necessity of establishing a Point of Time for taking the Vaccine Virus for the Purpose of Inoculation, as a Popular Criterion; in a Letter from Th. Jefferson to Dr. Waterhouse, dated Washington, Dec. 25, 1801.

“Knowing how little capable the people in general are of judging between genuine and spurious matter from their ap-

pearance, or that of the pustule, I endeavoured, in the course of my inoculations at M——, to find some other criterion for their guide. With this view I was very attentive to discover whether there be not a *point of time*, counting from vaccination, when the matter is genuine in all cases. I thought the eight times *twenty-four hours* furnished such a point; I governed myself by it, and it has been followed here successfully by Dr. Gantt: but your experience, so much greater, can inform us whether this rule is a sure one, or whether any other point of time would be still more certain. To the eye of experience this is not necessary; but for popular use it would be all-important; for otherwise the disease degenerates as soon as it gets into their hands, and may produce a fatal security. I think some popular criterion necessary to crown this valuable discovery."

THE ANSWER.

"I was forcibly impressed with the necessity of fixing on some point of time, by way of popular guide, when to take the vaccine fluid for the purpose of inoculation, in order to prevent the evils you suggest.

"I know that the perfection of the virus differs somewhat in different subjects; but in the formation of a general rule it is necessary to impose a limitation. Dr. Jenner says, 'I prefer the fifth day, or the sixth, or the seventh, eighth, or (if the efflorescence is not far advanced beyond the margin of the pustule) the ninth day.' But I conceive this is impossible to be discovered with requisite precision on the skin of the African. The criterion of *LIMPID matter* is fallacious: for, in the rising of a vesicle from almost any cause, the scarf-skin separates from the true, and a portion of the *superfluous water* of the blood, and sometimes of the *coagulable lymph*, is found under it. I have known this *limpid* fluid exude in considerable quantity from the vaccine pustule that has been too much irritated by pricking, and exhausted of its *virus*. It gives a shining, glazy appearance to the thread. I know of no writer or practitioner who has made this distinction.

"Were I, then, to fix on a point of time, of all others, as a general or popular rule, I should say EIGHT TIMES TWENTY-FOUR HOURS: this being the result of my own experience.

"BENJAMIN WATERHOUSE.

"Cambridge, Jan. 28, 1802."

PREMIUM OF THE CHEMICAL SOCIETY.

The Chemical Society of Philadelphia have appropriated fifty dollars for the purpose of procuring a medal, which is to be presented to any person who shall produce the best specimen of clay found in the United States, and fit for the manufacture of potter's ware.

No attention will be bestowed on clay inferior in quality to that from which the common imported queen's ware is manufactured, or on that which shall not have been found in such a situation and quantity as that it may be obtained and manufactured with convenience and profit.

Any person who shall be acquainted with clay, the exhibition of which may entitle him to be a candidate for the possession of the medal, is requested to deliver a specimen of such clay to one of the corresponding secretaries of the society, before the 1st day of January, 1804.

Together with any specimens of clay, sufficient evidence of its good qualities, and an account of the place and quantity in which it may be found, must be delivered, and every communication on this subject must be accompanied by a sealed note containing the name and residence of the author.

The medal will be adjudicated soon after the date above mentioned.

The Corresponding Secretaries of the Chemical Society for the present year are Dr. John C. Otto, Mr. John Y. Bryant, and the undersigned.

By Order of the Society,

R. HARE, jun.

Philadelphia, February 4, 1802.

PREMIUM OF THE AMERICAN PHILOSOPHICAL SOCIETY.

Mr. I. H. De Magellan, of London, having made a donation, to the American Philosophical Society, of *two hundred guineas*, to be vested in a permanent fund; that the interest arising therefrom may be disposed of, in awarding premiums to the authors of the best discoveries or most useful improvements relating to Navigation or to Natural Philosophy, mere Natural History only excepted. The following are the rules and conditions, adopted by the society, for the disposition of the proposed premiums, in conformity to the intention of the Donor, viz.

1. The candidate shall send his discovery, invention or improvement, addressed to the President or one of the Vice-Presidents of the society, free of postage or other charges; and shall

distinguish his performance by some motto, device or other signature, at his pleasure. Together with his discovery, invention or improvement, he shall also send a sealed letter, containing the same motto, device or signature, and subscribed with the real name and place of residence of the author.

2. Persons of any nation, sect, or denomination whatever, shall be admitted as candidates for this premium.

3. No discovery, invention or improvement shall be entitled to this premium, which hath been already published, or for which the author hath been publicly rewarded elsewhere.

4. The candidate shall communicate his discovery, invention or improvement, either in the English, French, German, or Latin language.

5. All such communications shall be publicly read or exhibited to the society, at some stated meeting, not less than one month previous to the day of adjudication, and shall at all times be open to the inspection of such members as shall desire it. But no member shall carry home with him the communication, description or model, except the officer to whom it shall be entrusted: nor shall such officer part with the same out of his custody, without a special order of the society for that purpose.

6. The society having previously referred the several communications, from candidates for the premium then depending, to the consideration of the twelve counsellors and other officers of the society, and having received their report thereon, shall, at one of their stated meetings, in the month of December, annually, after the expiration of this current year (of the time and place, together with the particular occasion of which meeting, due notice shall be previously given, by public advertisement) proceed to the final adjudication of the said premium: and after due consideration had, a vote shall first be taken on this question, viz. "Whether any of the communications then under inspection be worthy of the proposed premium?" If this question be determined in the *negative*, the whole business shall be deferred till another year; but if in the *affirmative*, the society shall proceed to determine, by ballot, given by the members at large, the discovery, invention or improvement most useful and worthy: and that discovery, invention or improvement which shall be found to have a majority of concurring votes in its favour, shall be successful. And then, *and not till then*, the sealed letter accompanying the crowned performance, shall be opened, and the name of the author announced as the person entitled to the said premium.

7. No member of the society who is a candidate for the premium then depending, or who hath not previously declared to the society, either by word or writing, that he has considered and weighed, according to the best of his judgment, the comparative merits of the several claims then under consideration, shall sit in judgment, or give his vote in awarding the said premium.

8. A full account of the crowned subject shall be published by the society as soon as may be after the adjudication, either in a separate publication, or in the next succeeding volume of their transactions, or in both.

9. The unsuccessful performances shall remain under consideration, and their authors be considered as candidates for the premium, for five years next succeeding the time of their presentment; except such performances as their authors may, in the mean time, think fit to withdraw: And the society shall annually publish an abstract of the titles, object or subject matter of the communications so under consideration, such only excepted as the society shall think not worthy of public notice.

10. The letters containing the names of authors whose performances shall be rejected, or which shall be found unsuccessful after a trial of five years, shall be burnt before the society without breaking the seals.

11. In case there should be a failure, in any year, of any communication worthy of the proposed premium, there will then be two premiums to be awarded in the next year. But no accumulation of premiums shall entitle an author to more than one premium for any one discovery, invention, or improvement.

12. The premium shall consist of an oval plate of solid standard gold, of the value of *ten Guineas*. On one side thereof shall be neatly engraved a short Latin motto suited to the occasion—together with these words, *The premium of I. H. De Magellan, of London, established in the year 1786*; and on the other side of the plate shall be engraved these words, *Awarded by the A. P. S. to ———, for his discovery of ——— A. D. ———, President*. And the seal of the society shall be annexed to the said golden plate, by a ribbon passing through a small hole near the lower edge thereof.

MEDICAL SOCIETY OF NORTH-CAROLINA.

Raleigh, December 8.

On Tuesday last, the Medical Society of North-Carolina met in this city, and adjourned on Thursday evening. A con-

siderable number of respectable Physicians from various parts of the State were present. At the opening of the society, the President delivered an Address, in which a cursory narration of the progress of the Science of Medicine from the earliest ages was given, and the most eligible means of promoting its utility in this country were pointed out. Various subjects of Medical Science were discussed.—An ingenious practical Treatise on general Dropsy was read by Doctor Wheaton, in which a successful method of treating that formidable disease was illustrated by relations of particular cases.

The society resolved on attempting to make a collection of such of the indigenous productions of the United States as may be found to have medical properties; a member of the society is appointed to superintend their cultivation and preserve them for a Botanic Garden, which they are taking measures to establish at the place of their annual meetings.

In consequence of the invitation given by the Society at their last annual meeting, and the encouragement offered, several medicinal articles have been cultivated in different places in the State with advantage, but not in such quantities as to entitle any person to a premium. The partial success of these trials has induced the society to continue the offer of the premiums for the following year.

A committee of three members is appointed to devise and report to the next convention of the society, a plan for the establishment of a Library, and the collection of a Museum of Anatomical preparations, and such other Curiosities of Nature and Art as may be deemed worthy of preservation by the Physician or Naturalist.

Four members are appointed to present Dissertations to the next annual meeting.

The best mode of preventing and curing Infantile Diseases is given as a prize subject for the ensuing year.

The Officers elected for the year 1802 are Doctors John C. Osborn, President; Thomas Mitchell and Richard Fenner, Vice-Presidents; James Webb and John Claiborn, Censors; Calvin Jones, Corresponding-Secretary; Starling Wheaton, Recording-Secretary; and Cargil Massenburg, Treasurer.

AMERICAN PHILOSOPHICAL SOCIETY.

Philosophical Hall, Philadelphia, Jan. 1, 1802.

The following persons were duly elected officers of the American Philosophical Society, held at Philadelphia:

Thomas Jefferson, *President.*

Robert Patterson,	}	<i>Vice-Presidents.</i>
Caspar Wistar,		
Benjamin Smith Barton,		
John Redman Coxe,	}	<i>Secretaries.</i>
Adam Seybert,		
Thomas C. James,		
Joseph Clay,	}	<i>Counsellors for three years.</i>
James Woodhouse,		
John Bleakly,		
B. H. Latrobe,	}	<i>Curators.</i>
Samuel Duffield,		
C. W. Peale,		
John R. Smith,	}	<i>Treasurer.</i>
Robert Leslie,		
John Vaughan,		

AGRICULTURAL SOCIETY OF THE STATE OF NEW-YORK.

The Agricultural Society of the State of New-York held their annual meeting at Albany, on Wednesday evening, the 17th February, 1802, for the election of officers, when the following gentlemen were chosen:

Robert R. Livingston, Esq.	<i>President.</i>
Ezra L'Hommedieu, Esq.	<i>Vice-President.</i>
John Tayler, Esq.	<i>Treasurer.</i>
Dr. Samuel L. Mitchill,	} <i>Secretaries.</i>
Dr. Benjamin De Witt,	
John Lansing, jun. Esq.	} <i>Committee of Publication.</i>
Stephen Van Rensselaer, Esq.	
Simeon De Witt, Esq.	
Stephen Lush, Esq.	
Rev. John B. Johnson,	

MEDICAL SOCIETY OF SOUTH-CAROLINA.

At the anniversary meeting of the Medical Society, held in Charleston, on the 24th of December, 1801, at the house of Mr. W. P. Young, the following gentlemen were elected officers for the ensuing year:

Samuel Wilson, M. D.	<i>President.</i>
James Moultrie, M. D.	<i>Vice-President.</i>
Edward D. Smith, M. D.	<i>Secretary.</i>
Dr. Joseph H. Ramsay,	<i>Treasurer.</i>

BILL OF MORTALITY FOR PORTSMOUTH, NEW-HAMPSHIRE, FOR A. D. 1801. *By Lyman Spalding, M. B. &c.*

<i>Disease.</i>	<i>Age.</i>	<i>No.</i>
Aphtha.	3 Weeks.	1
Apoplexy.	39 Years.	1
Atrophy.	{ 3 Weeks. 50, 3 Years. 4 Months. 55 Years.	{ 5
Cancer.	65, 76 Years.	2
Cholera Infantum.	6 to 18 Months.	7
Consumption.	{ 54.50.56.75.44.35.27.83.65.69. 56.50.60.44.32.55.26.40.48.32.	{ 20
Debauchery.	25, 29 Years.	2
Dropsy.	28, 41 Years.	2
Dropsy in the brain.	12 Months.	1
Epilepsy.	4 Weeks. 10 Years. 8 Weeks.	3
Fever, Bilious	{ 26. 30—45—18. 28—18. 14— 64—8. 33.	{ 10
Fever, Pulmonic.	12 Days. 15, 21, 84 Years.	4
Hooping-Cough.	3 Months to 4 Years.	11
Iliac Passion.	95 Years.	1
Mortification.	60 Years.	1
Nephritis.	74, 66 Years.	2
Old Age.	82, 99, 75, 76, 80 Years.	5
Palsy.	{ 54. 42—68. 64—77. 46. 64— 64. 43—60. 19. 80.	{ 12
Phrenitis.	31 Years.	1
Scrophula.	8 Years.	1
Still Born.		1
<i>Casualties.</i>	Burnt.	1
	Drowned.	3
	Fall.	1
	Frozen.	1
	Poison by Opium.	1
Total.		100

Portsmouth, situated 43d. 5m. north, 70d. 41m. west from London, contains 5511 inhabitants. The town has been very healthful, not one in fifty-five having died. A bilious remitting fever prevailed the whole year, which, in several instances, in September and October, manifested the malignant type. From June to October, the cholera infantum was prevalent. From September to the end of the year, the hooping-cough was endemic; very few children escaped it. A fifth part have died of phthisis pulmonalis! "IS THERE NO BALM IN GILEAD? IS THERE NO PHYSICIAN THERE?"

MEDICAL PUBLICATIONS.

We are glad to find that Professor Barton, of Philadelphia, has just published a second edition of his "Collections for an Essay towards a Materia Medica of the United States."

Dr. Caldwell, of Philadelphia, has published "An Oration on the Causes of the Difference in point of Frequency and Force, between the Endemic Diseases of the United States of America, and those of the Countries of Europe; delivered by appointment, to the Philadelphia Medical Society."

An "Annual Oration, delivered before the Chemical Society of Philadelphia," by Dr. Felix Pascalis, has just issued from the press.

We lately received from Jamaica, transmitted by the author to Dr. Mitchell, "The Medical Assistant, or Jamaica Practice of Physic; designed chiefly for the Use of Families and Plantations. By Thomas Dancer, M.D. late Physician to the Bath, and Island Botanist."

Dr. John Vaughan, of Wilmington, State of Delaware, re-published, some months ago, "The Female Monitor, consisting of a Series of Letters to Married Women on Nursing and the Management of Children. By the late Hugh Smith, M.D." To this work of Dr. Smith, Dr. Vaughan has added many occasional notes, together with a Compendium of the diseases of infants, by way of appendix.

A more particular account of these several publications will be given hereafter.

Dr. Waterhouse, of Cambridge (Mass.), intends soon to publish a tract, entitled "Practical Observations on the Local Appearance, Symptoms and Mode of treating the Kine-Pock."

MEDICAL BIOGRAPHY.

Short Account of the late Dr. Shippen, of Philadelphia, father of Professor Shippen, of the University of Pennsylvania; written by one of the grand-daughters of the deceased.

IT has been an approved custom for many ages, in all enlightened and civilized countries, to perpetuate, as far as possible, the characters and virtues of deceased friends, in order to compensate in that way the loss sustained by their removal from the world, and to transmit a knowledge of their worth for the imitation and benefit of posterity.

There has seldom occurred an instance in which there was more reason to perpetuate the virtues of an active and useful

life, than in the case of Dr. William Shippen, sen. who departed this life November 4th, 1801.

This worthy and excellent man was descended from one of the most ancient and respectable English families, which migrated to this country on account of religious persecution, first to Massachusetts, and then for the same cause to Pennsylvania, soon after its settlement by William Penn. He was born in Philadelphia, on the first of October, in the year of our Lord 1712. He applied himself early in life to the study of medicine, for which he had a remarkable genius. He possessed that kind of intuitive knowledge of diseases which cannot be acquired from books. In his practice he was uncommonly successful, by which means he soon rose to very high reputation and extensive business, which he retained to an advanced age: But, in his long journey through life, his useful labours were not confined to the duties of his profession.

He was the friend of learning. He was one of the founders of the College of New-Jersey, towards the establishment of which he contributed very largely, and was, for the greatest part of his life, one of its trustees: he has left it a considerable annuity for ever. He was also one of the trustees of the College of Philadelphia; and a member of the Philosophical Society, and, at one time, its Vice-President. He was the friend of Dr. Franklin. He was attentive to all public institutions; the Pennsylvania Hospital in particular is much indebted to him: he was the first physician who offered his voluntary attendance there, and, during many years, was its constant benefactor as well as one of its physicians; he also assisted at its foundation.

He was the friend of liberty and of his country. At an advanced age he was appointed a member of the Congress of the United States, in which station he proved himself an enlightened, well-informed patriot. He continued to rejoice in the prosperity of his country in the evening of his life, and was a decided advocate for the principles and form of the republican constitution of the United States.

He was the benefactor of the poor of every denomination, and at all times yielded to their calls, without compensation, as a physician. From his well-known ability and integrity, he was left guardian to many estates of the widow and orphan, to the poor of which class he has left a handsome legacy in his will.

But what is still more to his honour, he was the friend of religion. His hospitable doors were always open to the ministers of the gospel. He enjoyed a large share of the friend-

ship and confidence of the celebrated Mr. Whitefield. He was well acquainted with all the different systems of divinity, but was most strongly attached to that which was so ably defended by Mr. Edwards, one of the Presidents of the College of New-Jersey. He was also one of the founders of the first Presbyterian church of the city of Philadelphia, of which he was a member near seventy years. As a proof of the influence of the religion he loved, upon his conduct, it is worthy of notice, that in the whole course of his long life he never was once heard to swear profanely, nor to take his Maker's name in vain.

In private life he was the tender husband, affectionate parent, and kind master. To his family, in all its extensive branches, he was kind and attentive, and to all he was strictly just.

But amidst the bright cluster of his virtues conspicuously shone his humility, modesty, integrity, and truth. His temperance was so great that, until within a few weeks of his death, he never drank wine, nor any other spirituous liquor. He owed his health very much not only to his temperance, but to constant daily exercise. He superintended the business of his farm, and had always the entire management of his large estate, until a few months before he died. In his family he exhibited that simplicity in living which is alike consonant to the principles of christianity and republicanism; even his dress conveyed his ideas of simplicity, for he was opposed to ostentation in every thing. His temper was another remarkable trait in his character: it was uniformly sweet, as well as forbearing, forgiving, cheerful and serene. He had so much of the vivacity of youth, that, between eighty and ninety years of age, he often witnessed their pleasures when innocent, and even sometimes partook of them. His benevolence was so universal, that it may very justly be said of him, that he wished well to the whole human race.

He lived beloved, and at the great age of ninety years within some months, he bowed his reverend head to the will of his merciful Creator, amidst his numerous descendants, regretted and lamented, and was buried in the grave-yard of the church to which he had been so useful (by the side of six of his grandchildren), followed by a large train of his mourning relatives and friends.

 CORRESPONDENCE.

To the Editors of the Medical Repository.

GENTLEMEN,

BY perusing the Monthly Magazine and American Review for December, 1800, and the Medical Repository for November and December, 1800, and January, 1801, I find that my little treatise on the Physical Principles of Astronomy, appears to have been examined in a very cursory manner; and introduced to the public with an intimation, that a number of the fundamental principles have been gratuitously assumed without proof, and consequently are to be considered as mere matter of conjecture. As I presume you are acquainted with the reviewers, I must request you to be so obliging as to present the following comment to them, with my respectful compliments; and if it is consistent with your plan, I wish to have it inserted in the Medical Repository, together with whatever farther animadversions the reviewers may please to make: the more particular and critical they are in scrutinizing my principles, and endeavouring to show, that the electrical and other experiments which I have adduced, are not pertinent, and do neither elucidate nor corroborate my hypothesis, the more I shall be gratified. If this mode had been pursued at first, the review might have been more perfect; but unfortunately they spent too much time in detailing a system, from which they conjectured I had stolen (at least) the outlines of mine; whereas I had never heard the name of Mr. Hutchinson mentioned as an author until my hypothesis was formed, nor have I ever seen any thing but extracts from his works until this hour. I formed my system chiefly from observation, and reasoning analytically upon the facts and appearances that were discoverable by the senses, and by reading Dr. Priestley's History of Electricity, and trying a number of electrical experiments. I saw that the sun was continually emitting oceans of fire, which are diffused throughout the regions of space; and was told that this had been continued for more than six thousand years: I therefore compared the *sun*, as the reservoir of *fire*, to the *sea*, as the reservoir of *water*, and concluded they were both indestructible: I saw the water which evaporated from the surface of the ocean was conveyed back to its common receptacle, by springs,

rivers, &c. otherwise the sea would have been greatly exhausted by this time: I therefore concluded, that there was the same necessity that the fire should flow back to its common receptacle, that there was for the return of the water; otherwise the pabulum which supplies the sun would have been greatly diminished; and although it returns in a more condensed state, and with less apparent velocity, than the rays of light issue from the sun, yet it is certain that an equal quantity does return in equal times; which, by its rapid current, weight and spring, must produce an equal or rather more powerful effect on the sides of the planets that are opposite to the sun, than were produced by the elastic repulsive action of his rays on the atmospheres of the planets in going out: I say more powerful, because the appulsive influence has to overcome the centrifugal force of the planets, which must be very great.

But here I must observe, that as it is pure elementary fire which is sent forth from the sun, in diverging rays, when converged to a focus by a good burning glass, will flux the most refractory metals in a few seconds: when this indestructible element is returned to the sun in converging lines, it only requires the same degree of heat and agitation to be repeated, to cause it to resume its pristine qualities, of generating light, heat and motion. A consideration of these facts caused me to wonder that people should search for and expect to find the cause of motion in solid inert matter; and conclude, "that all matter gravitates to all matter;" when they could discover no such quality in it, but, on the contrary, a strong negative power to resist motion and remain at rest; and also saw motion in all cases communicated to inanimate matter by fluids. I soon perceived that all the motions in our atmosphere, from the most gentle breeze to the most violent storm, were caused by the alternations of heat and cold changing the equilibrium of the air: when the earth and its atmosphere are greatly heated in one place, by the rays of the sun, while the air is cooled and condensed in the vicinity, by the intervention of clouds, the cold dense air flows in, and displaces that which was rarefied, with a degree of velocity proportioned to the difference of temperature, until the balance is restored; that is, until the air has acquired an equal degree of heat or cold; and then a calm ensues. If this doctrine required any farther illustration, we have it in a discovery made by the celebrated Dr. Franklin: while he was a printer in the city of Philadelphia, there happened a violent north-east storm: in a few days after he received the papers from Georgia, the middle States, and from

Boston; and by comparing the accounts given in them, he discovered that the storm commenced in Georgia, after the air had been greatly heated, and retrograded regularly, until it arrived at Boston, several hours after it began in Georgia.—“Pray, Sir, (says a grave Newtonian) what do you mean to prove by this minute detail of facts, that are known to almost every school-boy?” I mean, in the first place, to intimate, that much of our ignorance is owing to our neglect to arrange and combine simple facts, which, when judiciously systematized, constitute the essence of all our useful knowledge.

I mean, in the next place, to prove, that the sun is the common source and dispenser of fire in our system; that this fire, by heating and rarefying the atmospheres of the planets and their satellites, renders them very elastic and strongly repulsive, by which means they act with great power upon their sides, that are continually presenting a new surface to the sun: while that part of their atmospheres which lies behind them in long dark cones, being deprived of the influence of the solar rays, is cooled, condensed, and rendered more weighty, and will, in consequence, press forward with a force and velocity proportioned to the different degrees of rarefaction and condensation of the atmospheres on their different sides; for if a cloud, intercepting the rays of the sun for an hour in one place, while they are heating the atmosphere in the vicinity, can condense it in one place and rarefy it in another, to a degree sufficient to produce a most violent wind, surely the interception of the body of the earth for many hours must produce a much greater effect.

Newtonian. “Were this doctrine true, we should have a constant rapid wind from the *westward*.” This certainly would be the case, if the earth did not progress with as great celerity as its atmosphere: but although it moves at the rate of 68000 miles every hour in its annual revolution, it glides along in its own atmosphere like a balloon, or a vessel floating with the tide: and if the earth moved with more celerity than its atmosphere, we should have a constant wind from the *eastward*. It is therefore evident, that if the earth should be suddenly stopped in its course, the current of its atmosphere would sweep every moveable substance on its surface to the *eastward*, as its atmosphere would continue to move at the rate of 1133 miles every minute.

Probably I may be told that this is a feeble attempt to revive the long exploded vortices of Descartes. As I freely confess my entire ignorance of the arguments adduced by Descartes,

in support of his hypothesis, or those of his opponents, to invalidate them, I will thank the reviewers for candid answers to the following questions, viz.

Query 1st. If the earth moves at the rate of 68000 miles every hour in its annual revolution, and revolves on its axis once in every 24 hours; if its atmosphere does not keep pace with both these motions; why have we not a constant rapid current of wind from the eastward?

Query 2d. If it must be granted that the atmosphere of the earth is impelled, by the powers above mentioned, to move from west to east at the rate of 68000 miles every hour, and also to progress with the surface of the earth in its diurnal revolution; in what particular circumstance do these *circular motions* differ from a *vortical revolution*?

Query 3d. Must not this amazingly rapid vortical current, acting agreeably to the laws of matter in motion, exert a strong appulsive power on the side of the earth opposite to the sun?

Query 4th. If the earth and its atmosphere move with equal celerity, is it not evident that it is sustained by and wafted along in the current of its own atmosphere, like a balloon, or a ship sailing down a rapid current with a fair wind?

It has been suggested that I have assumed some fundamental principles without proof: I freely confess that there are some phenomena in astronomy which oblige us to have recourse to analogy; but I have endeavoured to confine myself to a rule similar to that which Pope prescribed to himself in his *Essay on Man*:

" Say, first of heav'n above or earth below,
 " What can we reason but from what we know?"
 We see that power and motion every where
 Are caus'd by fire or water, gas or air:
 We also see all heavy bodies tend
 To earth, where all factitious motions end:
 Stones neither fly nor leap, nor walk nor crawl,
 But must be raised by art before they fall.
 Were gravitation nature's only law,
 And matter did all other matter draw,
 Comets and planets instantly would run
 Into one mass, and overwhelm the sun.

The first pointed objection made by the reviewers to my *Physical System*, is contained in page 441 of the *Monthly Magazine and American Review*, for December, 1800, respecting the extensive sphere of action assigned to the electric fluid, which I have supposed to be co-extensive with our solar system, and the secondary cause of all motion. This assump-

tion, as it is called, is founded upon a certain knowledge, that the electric fluid is the most energetic modification of fire; and that fire is continually emitted by the sun, in rays which pervade the whole system, and by their perpetual conflict with frost, do generate light, heat, life, and motion of all kinds. Many experiments and observations evince, that this fluid is not only more abundant, but more active in the superior regions than below; such as the aurora borealis, meteors, the tails of comets, &c. But if the reviewers, or any other person, will produce one single instance in which motion has been generated without the immediate or remote action of some modification of fire, I will acknowledge that I have assumed too much.

If any person should offer the action of the magnetic effluvia as an exception to this general rule, I stand ready to prove, by actual experiment, the magnetic to be a modification of the electric fluid, which is itself a modification of fire. But in the grand operations of our solar system, it requires a perpetual conflict between heat and cold to produce and perpetuate motion.

I confess that the second assumption, respecting the internal structure of the sun, is only supported by analogical reasoning, from what *we know*, to a case in which no experiment could be made, on account of the *distance* and *heat* of the *climate*.

Copernicus had ascertained the fact that the planets did revolve round the sun; but it remained for the physical astronomer to investigate and explain the cause of these revolutions. Sir Isaac Newton attempted to do this, but, I conceive, without success. And the reviewers contend that it is not necessary that the efficient cause of gravitation should be made known, although gravitation appears to be the basis of their system.

The third article they object to respects the repulsive influence ascribed to the atmosphere of the sun, and its appulsive force in returning. With respect to the sun's repulsive action, it consists in a two-fold operation, to wit, the impulsive influence of its rays, and the sudden rarefaction of the vaporous atmosphere of our earth, on the side successively presented to his rays, which is known to act with an expansive and repulsive power, proportioned to the degree of heat communicated in a given time. With respect to the powers of appulsion, every fluid in nature declares it to be an invariable law, that there shall be no *vacuum*; for, while the sun is sending forth the rarefied pabulum by which he is supplied, an equal quantity must return in equal times, or the equilibrium of the system

could not be maintained; the sun would soon be extinct, and light, heat, life, and motion be no more. If this igneous matter returns in a condensed state, as fast as it is emitted from the sun, it certainly must exert very strong appulsive powers upon the sides of the planets that are opposite to the sun, while it is returning with such amazing velocity. For if the disparity in the weight and spring of the air on our earth, caused by the different degrees of heat and cold, can create such surprising currents of air as we frequently experience, we should naturally expect much greater effects where rarefaction and condensation are produced in the most extreme degree.

The question may be asked, If the air moves with such amazing velocity from west to east, why do we not feel its force and perceive its effects? The reason is obvious; because the earth and its atmosphere move in the same direction, with equal velocity.

Were a balloon to be raised when the air was perfectly calm, and should remain stationary directly over the point from whence it was raised, is it not demonstrably evident, that, to keep pace with that point of the earth, it must move at the rate of 68000 miles every hour, although it apparently stood still, and the person seated in the car would feel no impulse of the air? Can it be necessary to tell even the most dull of comprehension, that if the balloon did really stand still, it would apparently move to the westward at the rate of 68000 miles every hour?

If my opponents should still dispute the existence of this rapid appulsive atmospheric current, let them first invalidate the force of the evidence already offered, and candidly answer the preceding questions relative to this subject: I will then consider their objections attentively, and answer them if I can.

The reviewers charge me with having censured gravitation, as an occult quality of matter, contrived to hide our ignorance. I candidly confess that I have ridiculed the idea of *attraction* as a most palpable absurdity, in all cases wherein one mass of solid matter has been supposed to draw another at a distance towards it, where there was no other connecting medium than fluid air, or a perfect vacuum; for I had long since relinquished the idea of the possibility of matter acting where it was not present. But that I ever censured *gravitation* as a fictitious quality of matter, is a mistake, caused by the ambiguity of the technical terms made use of by the Newtonians, which are so indefinite as to bear many different constructions, as appears by their own definition, to wit: "This law may be variously

“denominated: when referred to the earth, it may be called gravitation; when exerted in the planets, centripetal force; and when in the sun, the centre of our system, it is named attraction: we may therefore understand and interpret this law in various ways, either as an attractive power exerted by the sun, as an appetite or tendency in each planet, or as a force external to both the sun and the planets, impelling them to the sun, the impulse of a stream of fluid, and even the electric if preferred to any other, moving continually towards the sun.” For the reviewers say, “It is not necessary to the truth of the Newtonian theory, that the material or efficient cause of gravitation should be made known; it is sufficient (they say) to prove the existence of such a force directed towards the sun.”

But were we, for argument sake, to grant the existence of these assumed principles, and the full operation of all the powers they could possibly exert, agreeably to the laws assigned to them by Sir Isaac Newton, what would the result be? Would not attraction bring the planet in a direct line into the sun? It surely would, had not the Newtonians provided a projectile power to counteract this tendency, and prevent such a fatal catastrophe. But would not this projectile force soon be weakened, and at length quite destroyed, in passing through a resisting medium? Experience evinces this to be the invariable law by which projectiles are governed; but to obviate this difficulty they have also assumed a very extensive *vacuum*, in which the planets move, and meet with no resistance. They also allege that the attractive influence of the sun increases according to the squares of the distance of the planets from the sun, and that this influence diminishes in the same ratio as the planet to be acted upon is removed to a greater distance.

Now, if we allow the combined operation of all these assumed powers, and the provision of a perfect vacuum to facilitate their action, and also suppose the powers of attraction and projection exactly balanced, the only permanent revolution they could possibly produce would be perfectly *circular*, but could never produce and continue an elliptical revolution; because the very moment the planet should fall within the circular line, the attractive and gravitating influence would be gaining, and the projectile losing power, according to the squares of the distance, which would produce a spiral revolution, and soon bring the planet into the sun. It is also demonstrably evident, that from the time the planet should pass the line, where attraction and projection were equal in power,

the attractive and gravitating influence must be decreasing, and the projectile force increasing, every moment, according to the squares of the distance. What influence would then remain to bring the earth back to the line where attraction and projection are equally balanced? The Newtonians tell us, that the earth goes on receding from the sun until its projectile force is almost spent, or greatly weakened; that then gravitation begins to gain the ascendancy, and brings it back again! But I request them seriously and candidly to answer the following question, agreeably to their own principles, to wit: What can weaken, impair or destroy the force of a projectile, moving at the rate of 68000 miles every hour, through a perfect vacuum or unresisting medium, when the only obstacle to its progress is every moment decreasing in power, according to the squares of the distance?

If satisfactory answers cannot be given to these questions, I think it probable that I will not long remain the only heretic who will dispute the orthodoxy, and doubt the permanency of Sir Isaac's physical principles of astronomy, and question their legitimate claim to immortality.

The Newtonians allow that the earth recedes 3,235,882 miles farther from the sun at one time of the year than at another. If, therefore, they cannot prove that attraction and gravitation exert their greatest influence when the bodies to be acted upon are at the greatest distance from each other, they will be obliged to relinquish the doctrine of attraction, and embrace that of appulsion, or assume some other adequate power, to bring the earth back to the line where attraction and projection are supposed to be equally balanced. The reviewers complain, and I confess not without some reason, that I have not exhibited my opinions with sufficient minuteness of detail: for this omission I could assign many reasons; but the following may suffice, viz. While I followed the practice of physic I had very little leisure, and seldom wrote half a page at one time; and when I quit the practice I was deterred from writing by a fall which injured my breast: I had therefore determined not to publish my treatise in such an imperfect condition, until I was solicited by some of my friends to endeavour to fit it for the press; but after transcribing and correcting a few sheets, I was obliged, through indisposition, to quit it, and even suppressed some parts which I did not deem sufficiently correct. I flattered myself that my sentiments, as far as they were communicated, would be intelligible to some persons conversant in astronomy, who might improve

and explain my theory to more advantage than I have done: but if they differed in sentiment from me, I expected they would state their objections fairly, and show my errors in the strongest light, as nothing could give me much more pleasure than to see a judicious, candid Newtonian, seated to analyze my principles, and endeavour to demonstrate, that the experiments exhibited in the 15th, 16th, and 17th pages of the treatise, are not calculated to explain and establish the doctrine of repulsion and appulsion; and that what I have observed respecting the direction of the tails of comets, in their revolutions, is no evidence of the repulsive power of the solar rays. And when this is done, they may proceed to prove, that the glass tube mentioned in the 33d page of the treatise, was drawn up the ascent, and caused to revolve on its axis, by the *attractive* influence of the *fire*, and not by the appulsive influence of the cold dense *air* flowing in behind the tube, to displace the rarefied air in the fire-place. And as my theory rests essentially upon this position for its basis, viz. that fire, in its various modifications, is the physical cause of all motion, it would be the most effectual method to invalidate the whole system, to prove that motion can be generated and propagated independently of fire or any of its modifications. The only article in my system which rests entirely upon analogy, is my conjecture respecting the internal structure of the sun; and the only article in the Newtonian physical system that is founded in fact, upon any real property of matter, is *gravitation*: all the others, to wit, attraction, projection, and a supposed extensive vacuum, are all gratuitous assumptions, not only without proof, but contrary to analogy and daily experience. Ten yoke of oxen could not draw ten pounds one inch out of its place, with no other connecting medium between them and the load than fluid air. Neither would the apple have fallen from the tree, which gave Sir Isaac the first hint that gravitation was one principal cause of the celestial motions, had not the tree been raised to a considerable height, and the apple nourished by juices sent thither by the active influence of the solar rays: and daily experience shows us, that all projectiles move in curve lines until they fall to the earth, where they rest.—With respect to an extensive *vacuum*, it is contrary to the evidence of our senses, and should never have been introduced into physics. But, fictitious as these powers are, and the laws by which they are supposed to be governed, if we should grant their existence, and concede to them all the effects they could possibly produce, agreeably to the laws

assigned to them by Sir Isaac Newton, I conceive I have demonstrated that they could not possibly produce and continue an elliptical revolution. Whoever will consider the vast bulk of Saturn, his immense distance from the sun, the prodigious degree of velocity with which he moves in his orbit, which exceeds 22000 miles every hour, and estimate the astonishing centrifugal force this rapid motion must produce, and compare it with the Newtonian ratio of the diminution of the attractive influence of the sun, must be convinced that he would have deserted our system long since, had there not been some more powerful bond of union to restrain him than his greatly diminished attractive influence.

The reviewers ask, "If the sun, constructed in an appropriate manner, emits vast quantities of electric fire to impel the planets in their revolutions round his orb, how does the earth impel the moon, in a manner altogether analogous, though possessing no similarity of structure, for the purpose of accomplishing such an impulse?" I have endeavoured to prove that the sun is the *primum mobile* in our system; that by the penetrating activity of his rays he warms, agitates, and excites into action the atmospheres of his planets and their satellites, which are less or more electrical in proportion to their bulk and distance from the sun; by which means they act reciprocally upon each other by the powers of repulsion and appulsion. Although two cork balls have no similarity of structure to either the globe or prime conductor of the electric machine, yet when they receive the fluid from them they will actuate each other by the powers of repulsion and appulsion which have been communicated to them. In a similar manner the moon actuates the tides in our seas, by a powerful repulsive influence, when she arrives at the meridian; propelling the water in the Atlantic ocean, from the equator, northward and southward, raising high tides towards the poles, and none at the equator, in the Atlantic.

There are but few phenomena in nature more evident than that the moon is actuated both by the sun and the earth, by which means her motions are sometimes accelerated, and at others retarded; and as the direction of their compound influence is varying in almost every point of her orbit, she is caused to deviate from any constant track in her erratic revolution. Besides, it is evident that the moon is accelerated in her course by the vortical current of the earth's atmosphere, as she does not only keep pace with the earth in her annual revolution, but circulates round it once in every month.

It is a remarkable fact, that whenever frivolous objections have been made to Sir Isaac's physical system, they have been immediately answered, while those of the greatest importance are either entirely neglected, or treated with ill humour. The authors of the *Encyclopædia*, fol. 781, observe, that "as to the power of *gravitation* and *projection*, which Sir Isaac Newton assumed as the cause of the planetary revolutions, it is of the utmost importance to the physical astronomer to be ascertained, whether these forces are capable of producing the effects ascribed to them. Objections similar to those inserted have been published long ago, and we are surprized that no plain and direct answer hath yet been given to them. In 1762, a book entitled the *Principles of Natural Philosophy*, &c. by William Jones, made its appearance, in which, among other things, the author undertook to prove, that by a combination of gravitation and projectile force no lasting motion could be produced. As far as we know, no answer has been published to this treatise; and upon looking into the *Monthly Review*, vol. 27, we were surprized to find the author censured rather uncandidly for controverting Sir Isaac's opinion, while not a word is offered in answer to his objections, or a hint given where such a thing could be found: in other respects the reviewers own, that Sir Isaac himself has reasoned very weakly and inconclusively in physical matters. In 1764, another treatise of the same nature, entitled *Short Observations on the Principles and moving Powers assumed by the Present System of Philosophy*, was published. In this the whole physical part of Sir Isaac's system was attacked, and even ridiculed. The author asserted the insufficiency of the two forces of gravitation and projection to keep a planet in its orbit, and if no other power than these acted upon it, that it behoved to be hurried off in an eccentric curve. Being unacquainted with any answer to this treatise, we were obliged again to have recourse to the *Review* for 1764. We found the following answer, viz. that the argument is fallacious, because he does not take into consideration the time in which gravity acts on moving bodies. Certainly an objection of such a capital nature as this merited a more particular answer, or a direction to some other treatise where such an answer might be found. It is in a manner incredible, that such an excellent mathematician as Sir Isaac Newton should have assumed two powers, as first principles, which were utterly insufficient to produce the effect he ascribed to them; and on the other hand, if

“ they are sufficient, we are entirely at a loss to account for
 “ the want of replies to such objections in the common astro-
 “ nomical treatises, when others of at least as little conse-
 “ quence are fully obviated.” *Encyclopædia*, fol. 781, No.
 105; Newtonian physical system overturned by admitting the
 action of electricity in the heavens. “ But further we are
 “ afraid that most philosophers, even the most zealous advo-
 “ cates for Sir Isaac Newton, are inclined to admit the exist-
 “ ence of a power in the celestial regions, which must either
 “ be the cause of the planetary revolutions, or will utterly
 “ destroy their motions: the power we mean is that of elec-
 “ tricity. We have already quoted Dr. Hamilton conjecturing
 “ the tails of comets to be streams of electric matter; and in-
 “ deed their resemblance to the aurora borealis is so great, that
 “ it is almost impossible to ascribe the one to electricity, and
 “ the other to any different cause. But let us attend to the
 “ consequences of this supposition: the tails of comets are
 “ immensely large; Sir Isaac Newton computed that of the
 “ comet in 1680 to be eighty millions of miles in length.
 “ What inconceivable power must not such a stream of elec-
 “ tric matter be attended with? We are sure that by its means
 “ the comet would attract at the distance of 80,000,000 miles,
 “ and how much farther we cannot tell. If we suppose the
 “ sun to be the fountain of electricity, as well as heat and
 “ light, then undoubtedly he must attract and repel by means
 “ of his electric as well as his gravitating power, so that the
 “ law of gravitation must either be an effect of the electrical
 “ power, or behoved to be perpetually interrupted by it. If,
 “ with Henly, Cavallo, and others, we suppose the electric
 “ fluid to be a modification of fire, there is an end of Sir Isaac
 “ Newton’s physical system to all intents and purposes.”

If there ever was an electrician who disputed that electricity
 was not a modification of fire, he must also have doubted and
 disputed the evidence of his own senses. I have never ima-
 gined that the electric fluid was sent in rays from the sun; but
 I have long conceived it to be composed of fire and oxygen
 gas; and I wish the experiment to be made, by exposing the
 gas to the rays of the sun, in a close glass vessel, for some
 hours, and then set the vessel open, almost in contact with the
 globe or ruber, when the machine is in operation: I also wish
 the same experiment to be made with the fuming spirit of
 nitre, and with the strong sulphuric acid, poured into a bowl
 moistened with water, after it has been exposed to the solar
 rays. But previous to the application of the gas, I wish the

susceptibility of excitement to be tried, so that if any additional power should be communicated by the gas, it may be estimated.

Having endeavoured to render my system more intelligible, I will close the subject at present, by asking one question for information, viz. If the planets keep the same *course* and *distance* from the sun, and move exactly as *swift* by the powers of repulsion and appulsion as they are supposed to do by projection and attraction, by what means does my hypothesis tend to invalidate the importance of the discovery of Kepler's sublime proportions?

Herewith I send you a figure representing the equator, drawn east and west through the centre of the sun, and shewing the progress of the earth along the ecliptic every month in the year, beginning at the tropic of Capricorn, $23\frac{1}{2}$ degrees south of the solar equator, on the 21st day of June; with its axis always parallel to that of the sun. It crosses the solar equator on the 23d of September, and is then 1,617,941 miles farther from the sun than on the 21st day of June. On the 21st of December it arrives at the tropic of Cancer, $23\frac{1}{2}$ degrees north of the solar equator. And on the 21st day of March the earth crosses the centre of the sun again, and is exactly as far from it as it was on the 23d of September; consequently the sun is in the centre of the elliptical orbit, contrary to Kepler's supposed discovery, that the sun always kept in the lower focus of the elliptical orbit. Compare the 37th to the 40th pages of the treatise, with the 283d page of the 4th volume of the Medical Repository.

The figure also shews that the tides are raised to great heights, to the north and south of the terrestrial equator, by repulsion, and not by attraction at the equator, which certainly would have been the case were the Newtonian hypothesis true: for if the tides were raised by attraction, which is supposed to increase with the squares of the distance, the tides should certainly be higher at the island of Ascension, in the Atlantic, than at Whalebone Point, in north latitude 65 deg. I have shewn the figure of the earth on the line of the solar equator on the 23d day of September and the 21st of March, to shew the influence of the sun and moon in raising high tides by their repulsive action, both on their conjunction and opposition.

I am, Gentlemen, with the most sincere respect,
Your most obedient, humble servant,

JOSEPH YOUNG.

New-York, Dover-street, Nov. 28, 1801.

To the Editors of the Medical Repository.

GENTLEMEN,

I HAVE read with much satisfaction the ingenious remarks of Mr. Woodward, in your Review, Med. Rep. vol. 5, page 165, concerning the substance of the sun. The theory appears to be the most rational of any yet published; but I am a little surprized that you have considered that gentleman as the "pioneer" on that subject, after having seen my opinions in the Appendix to the History of Pestilential Diseases. You there find that I have suggested the opinion, that "the sun is the great *electric* of the system," by which I intended precisely the idea which Mr. W. has expressed by "a mass of electron." Hist. of Pest. p. 309. I have also suggested that space is filled with the matter of electron, constituting an atmosphere through which, as a medium, the laws of attraction and repulsion operate, p. 314. And I have gone so far as to intimate that the phenomena of tides, and of the opposite forces of the sun and moon, manifested by changes of weather, and by earthquakes and volcanic eruptions, in certain positions of these orbs, or at certain hours of the day, may be explained on the two principles of attraction and repulsion, or principles of electricity. I have examined the phenomena of tides with great care, and am collecting facts for a further investigation. From all the facts yet collected, it is more rational to ascribe the tides to repulsion or pressure of the moon on the water or atmosphere, than to attraction: and this seems to be the reason why there are small tides about islands; the water being repelled from east to west, is interrupted by the continents, but can be partially interrupted only by islands; and hence the higher tides are in the latitudes far north and south, the water being driven from the equatorial regions towards those points. Hence all rivers and bays, opening to the east on the eastern sides of the continents, or to the south towards the tropics, have higher tides than rivers and bays on the western sides of continents, and opening to the north—the water being propelled *from* the regions to which the moon is vertical: hence also there can be little tide in the Pacific, within the tropics, because there is no land to impede the current, or indeed in the middle of any great body of water—the tide being only a swell, caused by pressure, and thrown against the land.

Yours,

NOAH WEBSTER,

New-Haven, Dec. 20, 1801.

To the Editors of the Medical Repository.

GENTLEMEN,

I READ in your last number "*Considerations on the substance of the Sun*," by Augustus B. Woodward. The following paragraph determined me to write you this for your next number.

"The author's sentiments, under the fifth and sixth of these heads, are so *original* and curious, that we extract them for the *instruction* of our readers. After reciting the opinions of Newton, Buffon, Bowdoin, Herschell and Darwin, as to the cause of the *centrifugal force* of the planetary bodies, he proceeds thus to offer *his own reasons* for believing that it is owing to a repelling power in the mass of electron of which the sun is composed."

Now, I would observe that Dr. WATERHOUSE has delivered a similar idea, more than fourteen years ago, in his course of lectures on *Natural History* in the *University of Cambridge*, and which, I presume, that others of his pupils can remember as well as myself. Lest any one may object to quoting or referring to an unpublished lecture, I will quote a passage from what Dr. WATERHOUSE has *published*. It is from that gentleman's "*Discourse on Vitality, delivered in the First Church in Boston, 8th June, 1790, before the Massachusetts Humane Society*," page 16th (printed by T. & J. Fleet); and then I will leave it to the judgment of your readers to determine whether Mr. Woodward's idea is, strictly speaking, an *original* one, observing at the same time, that Dr. WATERHOUSE never, that I recollect, made use of the term *electron*.

"If it be asked, what is that vivifying something, which, through the medium of the atmosphere, gives this oscillation, or concussion, and continues life? I answer, it is a portion of that subtle *electric fluid* which fills the immense space of the whole universe, pervades all bodies, and actuates every particle of matter. By it the phenomena of magnetism, fire, and light are produced; and on it the various and astonishing phenomena of *vegetation* and *animation* depend. If it be asked farther, *what and where* is the *source* of this all-powerful agent? I answer, the SUN is the efficient cause of the motions of this fluid, and the various phenomena of our system are the effects of these motions." And, to enforce this idea on his pupils, the Dr. added this poetical quotation, from the "*Seasons*" of Thompson:

———"Soul of surrounding worlds!
Without whose quick'ning glance, this cumb'rous earth
Would be a lifeless mass, inert and dead."

February 1, 1802.

P. A.